PANEL-PC for S Series

PT-S959 Series
PT-S959LX

User's Manual

CONTEC CO.,LTD.

Check Your Package

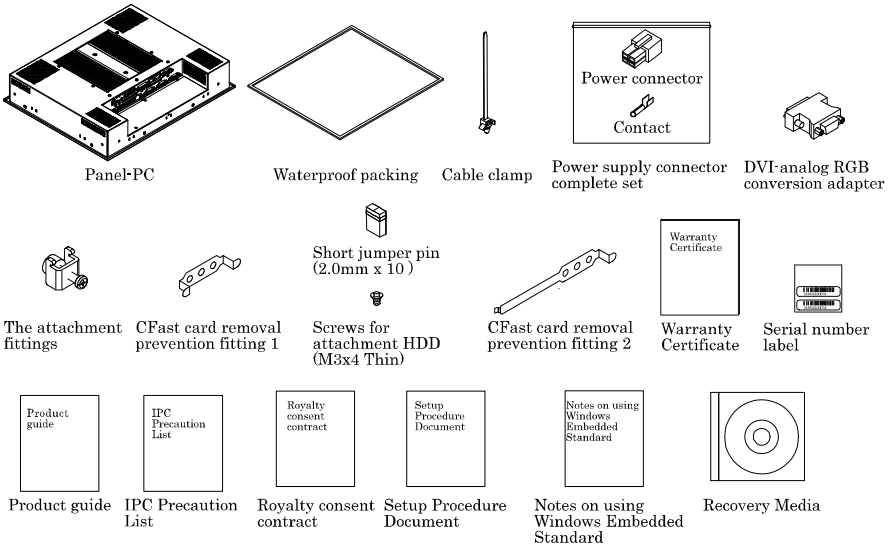
Thank you for purchasing the CONTEC product.
The product consists of the items listed below.
Check, with the following list, that your package is complete. If you discover damaged or missing items, contact your retailer. If you use driver & utility software set, download it form the CONTEC's Web site.

Product Configuration List

Name		PT- S959LX -DC6000 Base model Pcs.	PT- S959LX -DC6100 HDD model Pcs.
Panel-PC		1	1
Waterproof packing		1	1
The attachment fittings		10	10
CFast card removal prevention fitting 1		1	1
CFast card removal prevention fitting 2		1	1
Screws for attachment HDD (M3 x 4 THin)		4	4*1
Power supply connector complete set			
	Power connector	1	1
	Contact	4	4
Cable clamp		1	1
DVI-analog RGB conversion adapter		1	1
Short jumper pin		10	10
Product guide		1	1
IPC Precaution List		1	1
Warranty Certificate		1	1
Serial number label		1set	1set
Royalty consent contract		None	None
Setup Procedure Document		None	None
Notes on using Windows Embedded Standard		None	None
Recovery Media		None	None

*1 It is attached to the main body.
*Please confirm User Manual in a website.

Product Configuration Image



* See the Product Configuration List to check if all the components are included for the specified number of units.

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1. Introduction

About the Product

This product is a fanless PANEL-PC for embedded use based on Intel (R) Atom processor D2550 and a NM10 chipset. Adoption of the long life power saving LED and Intel (R) Atom processor offers low power consumption while ensuring sufficient performance.
The “resource-saving PC” contributes downsizing and power-saving of equipment to reduce your running cost and to promote energy efficiency.
It has extended interfaces such as 1000BASE-T, USB2.0, and serial.

CPU and chipset are embedded type with which this product could be reliable to use because of stable supply.

This product is available in the following 2 models:

- Base model and panel mount type equipped with Intel Atom Processor D2550 1.86GHz
  PT-S959LX-DC6000 (12.1-inch touch panel, LCD (XGA), Memory 2GB, without OS / CFast / 2.5-inch HDD)
- HDD installed model and panel mount type equipped with Intel Atom Processor D2550 1.86GHz
  PT-S959LX-DC6100 (12.1-inch touch panel, LCD (XGA), Memory 2GB, without OS / CFast, with 2.5-inch HDD)

Features

- Contributing to reduction of running cost and promotion of energy efficiency

Due to adoption of the low power consumption LED backlight and dual core processor Intel (R) Atom processor D2550, low power consumption, approximately 41W*1 even at a high load condition, is achieved at the same time sufficient performance is ensured, contributing to the lesser running cost.

*1 Median value of power consumption of a standard model PT-S959LX-DC6100 with input power of 24VDC under unloaded and fully-loaded conditions.

- Slim design facilitates design of compact equipment

This product employs a fanless construction (design does not use fan motors as these components have a finite lifetime) with CONTEC's unique heat dissipation technology and features a compact case that is only 63.2 mm *2 deep, which facilitates the design of compact equipment. The mounting structure conforms to VESA standard 100 x 100 mm and can be mounted on a LCD arm.

*2 Dimension of PT-S959LX-DC6000 not including the mounting bracket.

- High definition supported DVI external display output

This product has the up to 1920 x 1200 pixels DVI external display output as standard feature. A stand-alone two-display application which, for example, displays the screen on a big LCD TV separately from the main LCD, can be built. Also, with the accompanying analog RGB (15 pin HD-SUB) conversion adapter, connecting to an analog RGB display is supported.

- Remote power management function to reduce operation tasks

This product supports timed/automated system start-up (Resume By Alarm). For example, it enables unattended operation, such as starting to show information of an establishment in unison at opening time.

Also, it supports system start-up externally via network (Wake On LAN) and modem (Power On by Ring). It encourages significant labor saving in operation.

- Major types of peripherals are supported with rich interfaces including the two CFast card slots

It has a variety of extended interface such as 1000BASE-T x 2, USB2.0 x 4, serial x 4, CFast card slot x 1. The case also houses a 2.5-inch SATA drive bay for easy disk replacement.

- Falling-off prevention tools and cable clamps provided to avoid trouble caused by disconnected cable

This product stays trouble-free, being equipped with USB removal prevention fitting and cable clamp for connectors with no locking mechanism, such as USB cable, and with hardware to properly mount and avoid falling out of CFast card.

- A wide range of power supplies (10.8 - 31.2VDC) supported

As the product supports a wide range of power (10.8 - 31.2VDC), it can be used in a variety of power environments. The separately available AC adapter adds support for 100VAC power.

- Touch panel enables keyboard-less operation.

These products have analog touch panel enabling mouse emulation using driver software.

Supported OS

- Windows 7 Professional

Customer Support

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

Web Site

Japanese	http://www.contec.co.jp/
English	http://www.contec.com/
Chinese	http://www.contec.com.cn/

Latest product information

CONTEC provides up-to-date information on products.
CONTEC also provides product manuals and various technical documents in the PDF.

Free download

You can download updated driver software and differential files as well as sample programs available in several languages.

Note! For product information

Contact your retailer if you have any technical question about a CONTEC product or need its price, delivery time, or estimate information.

Limited One-Year Warranty

CONTEC products are warranted by Contec Co., Ltd. to be free from defects in material and workmanship for up to one year from the date of purchase by the original purchaser.

Repair will be free of charge only when this device is returned freight prepaid with a copy of the original invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from which it was purchased.

This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and original products. The warranty is not applicable if the device has been tampered with or damaged through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in which case repairs will be considered beyond the warranty policy.

How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice. Please obtain a Return Merchandise Authorization number (RMA) from the CONTEC group office where you purchased before returning any product.

* No product will be accepted by CONTEC group without the RMA number.

Liability

The obligation of the warrantor is solely to repair or replace the product. In no event will the warrantor be liable for any incidental or consequential damages due to such defect or consequences that arise from inexperienced usage, misuse, or malfunction of this device.

Safety Precautions

Understand the following definitions and precautions to use the product safely.

Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources. Understand the meanings of these labels to operate the equipment safely.

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Caution on the PT-S959 Series

Handling Precautions

⚠ WARNING

- Always check that the power supply is turned off before connecting or disconnecting power cables.
- Procedures that could result in serious injury or loss of human life should never be performed from a touch panel. Use system design methods that can guard against input errors.
- Do not modify the product.
- Always turn off the power before inserting or removing circuit boards or cables.
- This product is not intended for use in aerospace, space, nuclear power, medical equipment, or other applications that require a very high level of reliability. Do not use the product in such applications.
- If using this product in applications where safety is critical such as in railways, automotive, or disaster prevention or security systems, please contact your retailer.
- Do not attempt to replace the battery as inappropriate battery replacement poses a risk of explosion.
- For battery replacement, contact your retailer as it must be performed as a process of repair.
- When disposing of a used battery, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.

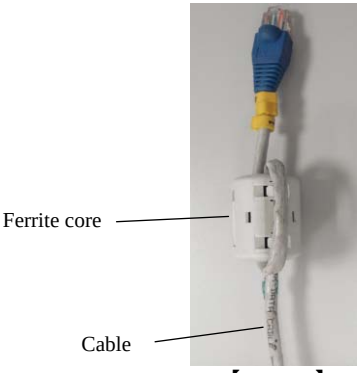
⚠ CAUTION

- Do not use or store this product in a location exposed to high or low temperature that exceeds range of specification or susceptible to rapid temperature changes.
  Example: - Exposure to direct sun
  - In the vicinity of a heat source
- Do not use this product in extremely humid or dusty locations. It is extremely dangerous to use this product with its interior penetrated by water or any other fluid or conductive dust. If this product must be used in such an environment, install it on a dust-proof control panel, for example.
- Avoid using or storing this product in locations subject to shock or vibration that exceeds range of specification.
- Do not use this product in the vicinity of devices that generate strong magnetic force or noise. Such products will cause this product to malfunction.
- Do not use or store this product in the presence of chemicals.
- To clean this product, wipe it gently with a soft cloth dampened with either water or mild detergent. Do not use chemicals or a volatile solvent, such as benzene or thinner, to prevent pealing or discoloration of the paint.
- This product's case may become hot. To avoid being burned, do not touch that section while this product is in operation or immediately after turning off the power. Avoid installation in a location where people may come into contact with that section.
- CONTEC does not provide any guarantee for the integrity of data on CFast.
- Always disconnect the power cable from the receptacle before connecting or disconnecting any connector.
- To prevent corruption of files, always shutdown the OS before turning off this product.
- CONTEC reserves the right to refuse to service a product modified by the user.
- In the event of failure or abnormality (foul smells or excessive heat generation), unplug the power cord immediately and contact your retailer.
- To connect with peripherals, use a grounded, shielded cable.
- Do not use any sharp-pointed object such as a mechanical pencil to touch the touch panel. Doing so may scratch the touch panel, resulting in malfunctions.
- Do not subject the touch panel to shock as doing so may break it.
- When the surface or frame of the touch panel has become dirty, wipe it with neutral detergent. Do not wipe the touch panel with thinner, alcohol, ammonia, or a strong chlorinated solvent. Use a protective sheet (available as an option) if the touch panel is used where it can easily collect dust and dirt.
- It is a characteristic of analog touch panels that their resistance may vary with changes to the ambient environment (temperature and humidity) and with their own aging, resulting in the deviation of the detection point. If this is the case, calibrate the touch panel again to re-set calibration data.
- LCD may have a few bright spots that are always on or a few black spots that are always off. Color irregularity may also occur depending on the viewing angle. This however is due to the structural characteristics of the LCD; therefore, it is not a product fault.
- Burn-in on TFT Display
  "Burn-in" may occur if the same display is retained for a long time. Avoid this by periodically switching the display so that the same display is not maintained for a long time.
  * Burn-In : Phenomenon characterized by a TFT display as a result of long-time display of the same screen where a shadow-like trace persists because electric charge remains in the LCD element even after the patterns are changed.

- The CFast card connector and 2.5-inch HDD slot do not support hot plugging. CFast cards and 2.5-inch HDDs cannot be removed or inserted while the power is on. Do not remove or install CFast cards or 2.5-inch HDDs or connect to CFast cards or 2.5-inch HDDs while the unit is turned on. This product may malfunction or cause a failure.
- Component Life:
  (1) Battery---The internal calendar clock and CMOS RAM are backed by a Lithium primary battery. The backup time at a temperature of 25°C with the power disconnected is 7 years or more.
  (2) HDD --- HDD models use the HDD to store the operating system. For details, see optional HDD [PC-HDD100S].
  (3) Touch panel--- The operating lifetime of the touch panel is at least 1 million touches (as tested by mechanical touching under 250g of force at a rate of two presses per second).
  (4) LCD backlight--- Display brightness decreases over time with use. The operating lifetime of the backlight is 50,000 hours (the time until the brightness is lowered to 50% of the initial value).
  * Replacement of expendables is handled as a repair (there will be a charge).
  * Component life is not guaranteed value but only referential value.
- Regarding “EMC Instruction Class A Notice”
  The ferrite core must be installed in the following each cable so that this product may suit the above-mentioned standard. For the type of ferrite core, refer to the following table (Equivalent types are also available.)

Port	Name	Maker	Turn
LAN A/B	E04SR211132	SEIWA	2

- Image diagram



【Turn：2】

FCC PART 15 Class A Notice

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference at his own expense.

WARNING TO USER

Change or modifications not expressly approved the manufacturer can void the user's authority to operate this equipment.

2. System Reference

Specification

Table 2.1. Functional Specification < *1 / 2* >

Model		PT-S959LX-DC6000	PT-S959LX-DC6100
Assembly type		Panel mounted	
CPU		Intel® Atom™ Processor D2550 (1.86GHz)	
Chip set		Intel® Atom™ D2550 + Intel® NM10	
BIOS		BIOS (mfd. by AMI)	
Memory		2GB (204pin SO-DIMM x 1), PC3-8500 DDR3 SDRAM	
Graphic	Controller	Intel® GMA3650 (Built in Intel® Atom™ Processor D255) Multi-monitor function supported *1	
	Video RAM	Main memory shared	
	Video BIOS	64KB(C0000H-CFFFFH)	
LCD type	LCD type	12.1-inch TFT color LCD, XGA(1024 x 768), 16,770,000 colors	
	Backlight	LED method, The ON/OFF software can control.	
Touch panel	Resolution	2048 x 2048 (emulated in 1024 x 768 mode)	
	Detection method	Resistive-film analog type	
	Connection	Internal USB port	
External display output	DVI *2	640 x 480, 800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,400 x 1,050, 1,600 x 900, 1,600 x 1,200, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200RB (16,770,000 colors)	
	Analog RGB	640 x 480, 800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,400 x 1,050, 1,600 x 900, 1,600 x 1,200, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200 (16,770,000 colors)	
Audio		HD Audio compliant, LINE OUT x 1, MIC IN x 1	
Serial ATA I/F		None	2.5-inch SATA HDD, slot-in system x 1, Corresponding to serial ATA 1.0a standard port
LAN*3		Realtek 8111E Controller 1000BASE-T/100BASE-TX/10BASE-T x 2 (Wake On LAN support)	
USB		USB 2.0-compliant 4 port	
Serial		RS-232C (general-purpose): 2ch (SERIAL PORT1,2), 9-pin D-SUB connector (male) RS-232C/422/485 (general-purpose): 1ch (SERIAL PORT3), 9-pin D-SUB connector (male) RS-422/485 (general-purpose): 1ch (SERIAL PORT4), 9-pin D-SUB connector (male) Baud rate: 50 - 115,200bps	

*1： A multi-screen display function using the main LCD and an external display. The "Twin" option is, however, not available for a combination with an external DVI-connected display. "Extended desktop" or "Intel ® dual display clone" can be used instead.

*2： Display of the DVI-connected screen becomes active after the Windows starts up.

*3： Care about ambient temperature when using 1000BASE-T. Refer to "Installation Requirements" in chapter 3 for details.

Table 2.1. Functional Specification < *2 / 2* >

Model		PT-S959LX-DC6000	PT-S959LX-DC6100
General-purpose I/O		None	
Hardware monitoring		Monitoring CPU temperature, board temperature, power voltage	
Watch dog timer		Software programmable, 255 level (1sec - 255 sec), Causes a reset upon time-out.	
Real-time clock		NM10 integrated, The real-time clock is accurate within ±3 minutes (at 25°C) per month, Lithium backup battery life : 7 years or more	
Power Management		Power management setup via BIOS, Power On by Ring / Wake On LAN, Supports PC98/PC99 ACPI Power management	
Interface	External display	1 port (29 pin DVI-I connector), DVI-analog RGB conversion adapter attachment	
	Audio	LINE OUT: ϕ3.5 Stereo mini jack, Full-scale output level 1.2Vrms (Typ.), MIC IN: ϕ3.5 Stereo mini jack, Full-scale input level 1.5Vrms (Typ.)	
	CFast card slot	1 slot, CFast card Type I, bootable	
	2.5-inch HDD slot	1 slot, 2.5-inch HDD, bootable	
		None	HDD slot is finished mounting 2.5-inch HDD *4
	LAN*2	2 port (RJ-45 connector)	
	USB	4 port (A-TYPE connector)	
	RS-232C	4 port (9pin D-SUB connector [male])	
Power supply	Power supply connector	12 - 24VDC *5	
	Input power supply voltage	10.8 - 31.2VDC	
	Current consumption	12VDC: 2.6A(Typ.) 5.3A (Max.) 24VDC: 1.7A(Typ.) 3.0A (Max.)	
	External device power supply capacity	CFast card slot: +3.3VDC 1A (500mA per slot), USB port: +5VDC 2A (500mA per slot), HDD slot: +5VDC 1.1A (1100mA per slot)	
Waterproofing and dust-proofing		Front panel IP65 standard	
Panel cut dimensions (mm)		303 (W) x 243 (H)	
Physical dimensions (mm)		316(W) x 63.2 (D) x 256 (H) (internal-panel depth) (Storage device isn't included)	
Weight		4.0kg	4.2kg

*4: The capacity of CFast or HDD is a value when 1GB is calculated by 1 billion bytes. The capacity that can be recognized from OS might be displayed fewer than an actual value.

*5: Use a power cable shorter than 3m.

Table 2.2. Installation Environment Requirements

Model		PT-S959LX-DC6000	PT-S959LX-DC6100
Operating temperature *6		0 - 50°C	
Storage temperature		-10 - 60°C	
Operating humidity		10 - 90%RH (No condensation)	
Floating dust particles		Not to be excessive	
Corrosive gas		None	
Noise resistance	Line noise	AC line / ±2kV *7, Signal line/±1kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3)	
	Static electricity resistance	Contact discharge / ±4kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2), Atmospheric discharge / ±8kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)	
Vibration resistance	Sweep resistance	When HDD is turned on *8 : 10 - 50Hz/0.5G 25 min. each in x, y, and z directions (JIS C60068-2-6-compliant, IEC60068-2-6-compliant)	
		When HDD is turned off *8 : 10 - 57Hz/semi-amplitude 0.15 mm 57 - 500Hz/2.0G 40 min. each in x, y, and z directions (JIS C 60028-2-6-compliant, IEC 60068-2-6-compliant)	
Impact resistance		10G, half-sine shock for 11 ms in x, y, and z directions (JIS C60068-2-27-compliant, IEC68-2-27-compliant)	
Grounding		Class D grounding, SG-FG / continuity	

*6 : For more details on this, please refer to chapter 3, “Installation Requirements”.

*7 : When using AC-DC power supply unit FSP065-RAB (FSP).

*8 : When using optional hard disk PC-HDD100S (CONTEC).

Display Optical Specifications

Table 2.3. Display Optical Specifications

Parameter	Condition			Min.	Typ.
Visual angle (vertical)	CR≥10	ϕ = 180°	Display. Monochrome	70deg	80deg
		ϕ = 0°		70deg	80deg
Visual angle (horizontal)		ϕ = +90°		70deg	80deg
		ϕ= -90°		70deg	80deg
Surface brightness (at center)	Display in white			380cd/m²	500cd/m²

* "Surface brightness" represents a numerical value per display. The expected brightness through a touch panel is about 80% lower than the above value.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness at screen center with white displayed}}{\text{Brightness at screen center with black displayed}}$$

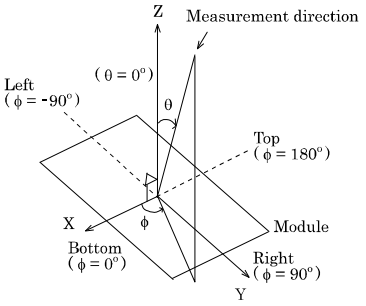


Figure 2.1. Definition of viewable range

⚠ CAUTION

The above optical specification data shows optical characteristics of the liquid crystal in the display; the data does not represent the actual view on the display or its viewing angles.

Power Management Features

- Support both ACPI (Advanced Configuration and Power Interface) and legacy (APM) power management.
- ACPI v2.0 compliant
- APM v1.2 compliant
- Support hardware automatic wake-up

Power Requirements

Your system requires a clean, steady power source for reliable performance of the high frequency CPU on the product, the quality of the power supply is even more important. For the best performance makes sure your power supply provides a range of 10.8 V minimum to 31.2 V maximum DC power source.

Power Consumption

For typical configurations, the CPU card is designed to operate with at least a 60W power supply. The power supply must meet the following requirements:

- Rise time for power supply: 2 ms - 30 ms

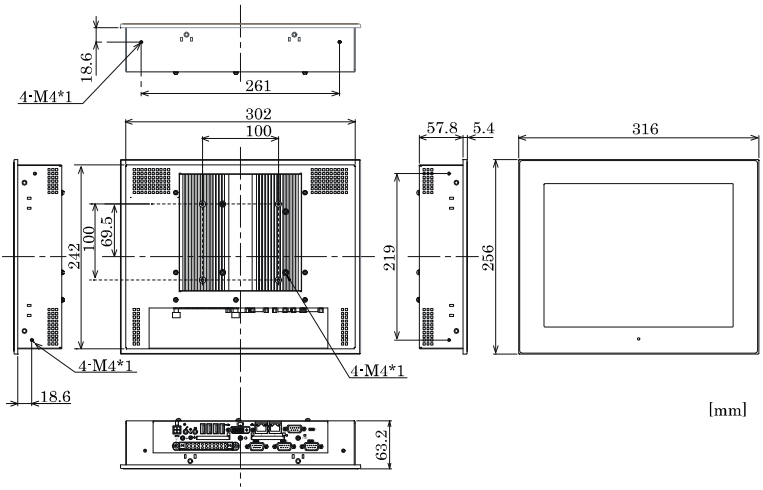
The following table lists the power supply's tolerances for DC voltages:

Table 2.4. DC voltage tolerance

DC Voltage	Acceptable Tolerance
+ 12 - 24VDC	+ 10.8 - 31.2VDC

Physical Dimensions

PT-S959LX-DCxxxx



*1 Tip of any mounting screw must not protrude 5mm or more inside the case.

Figure 2.2. Physical Dimensions (PT-S959LX-DCxxxx)

3. Hardware Setup

Before Using the Product for the First Time

Follow the next steps to set up this product:

STEP1 By referring to the information in this chapter, install, connect and set this product.

STEP2 Connect cables.
Connect the cable of necessary external devices, such as keyboard and a mouse, to this product using appropriate cables.

STEP3 Turn on the power.
After verifying that you have correctly followed steps 1 and 2, turn on the power.
If you find any abnormality after turning on the power, turn it off and check to see if the setup has been performed properly.

STEP4 Set up BIOS.
By referring to Chapter 5, set up BIOS. This setup requires a keyboard.

*1 Before using this product, be sure to execute “LOAD SETUP DEFAULTS” to initialize the BIOS settings to their default values.
(See Chapter 5, “Main Menu.”)

⚠ CAUTION

Be sure to connect the keyboard and mouse to it before turning the power on for the first time.

Hardware Setup

- Before you start, be sure that the power is turned off.
- Remove only those screws that are explained. Do not move any other screw.

Attaching the CFast Attachment Fittings

(1) After inserting a CFast Card, fasten the bundled CF attachment fittings with a screw.

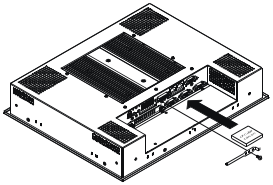


Figure 3.1. Attaching the CFast Attachment Fittings

⚠ CAUTION

- Insert the CFast Card face up.
- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 3 - 3.5kgf·cm.

Attaching the HDD

(1) Remove the hard disk bracket from the main body.

(2) Attach the hard disk to the hard disk bracket and secure it by tightening the four screws.

(3) Insert the hard disk bracket with the hard disk attached into the main body, and secure it by tightening the screws.

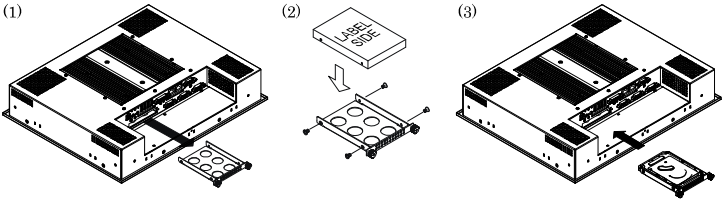


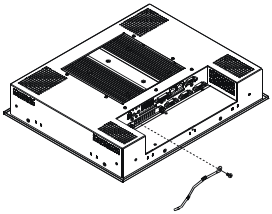
Figure 3.2. Attaching the HDD

⚠ CAUTION

- Insert the Hard disk face up.
- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 3 - 3.5kgf·cm.

Attaching the FG

(1) Use screws to attach the FG.



* Attached screw (M3 x 8)

Figure 3.3. Attaching the FG

⚠ CAUTION

The FG pin of this product is connected to the GND signal of the DC power connector (DC-IN). Note that the connection cannot be cut off.
Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 5 - 6kgf·cm.

Fastening the Cable

This product comes with clamps for fixing cables.

Fastening the LINEOUT, USB Cable

The system unit has a hole for attaching cable clamp. Using a cable clamp for a cable with lock-less connector, such as the LINEOUT and USB Cable, prevents the connector from being unplugged. Use the cable ties and cable clamps appropriately according to the connecting states and wiring directions of cables.

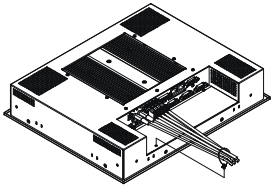


Figure 3.4. Attaching the cable clamp

Hardware Setup

PT-S959LX-DCxxxx

(1) Cut out a panel according to the following dimensions to mount the main unit.

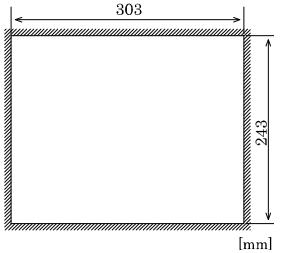


Figure 3.5. Dimensions of Panel Opening

(2) Place the waterproof packing in the groove on the front face of the main body and insert the main body into the panel from the external side.

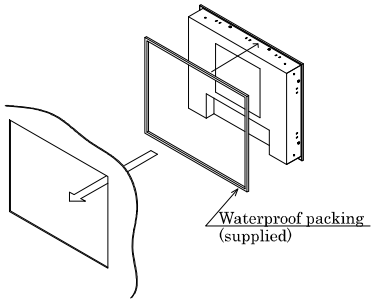


Figure 3.6. Attaching the waterproof packing

(3) Hold the attachment fittings from the inside of the panel.

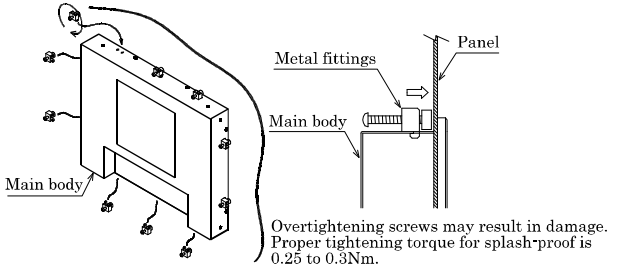


Figure 3.7. Hardware Setup

⚠ CAUTION

Screw holes may be damaged if screws are tightened with a torque greater than the specified torque. The specified tightening torque is 5 - 6kgf·cm.

When using VESA standard 100mm mounting holes

The main body has mounting holes according to VESA standard 100mm. When using a VESA standard 100mm stand or the like, attach it as shown the following figure.

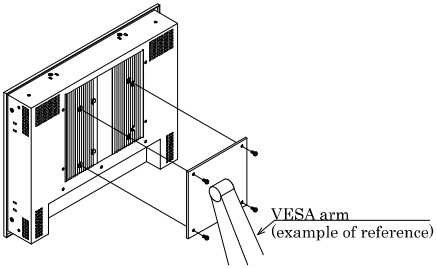


Figure 3.8. Installation of VESA metal fittings

Installation Requirements

Be sure that the ambient temperature is within the range specified in the installation environment requirement by making space between the product and device that generates heat or exhaust air.

Installed angle which is recommended 45°

Installed angle of this product which is recommended is 0 - 45°. Except for that, the temperature specification of this product might not be filled.

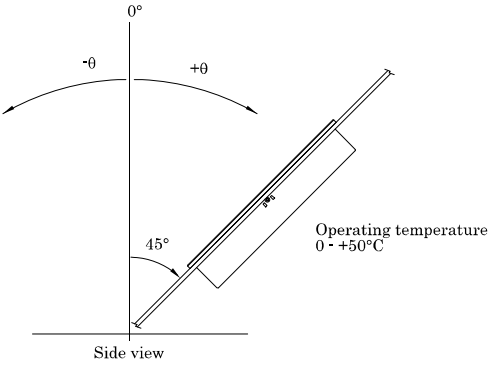


Figure 3.9. Installed angle which is recommended

⚠ CAUTION

Note that even though the ambient temperature is within the specified range, an operational malfunction may occur if there is other device generating high heat; the radiation will influence the product to increase its temperature.

Distances between this product and its vicinity

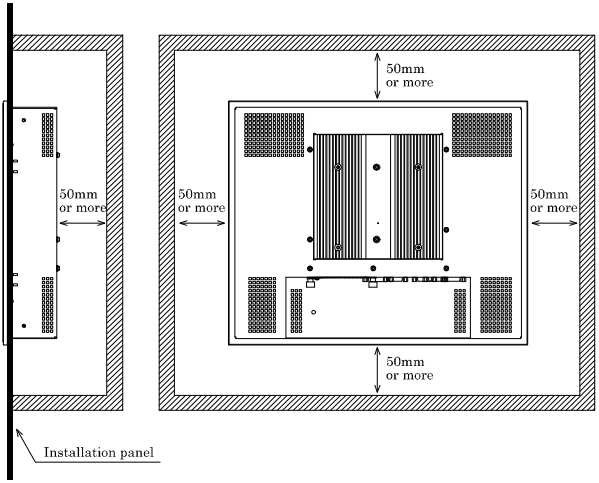


Figure 3.10. Distances between this product and its vicinity

⚠ CAUTION

Do not install this product into the fully-sealed space except the case in which the internal temperature is adjustable by equipment such as air conditioner. Troubles such as operational malfunctions could be occurred by the temperature increase caused by long-term usage.

Ambient temperature

In this product, the ambient temperature is decided from the multiple measurement points as shown below. When making use of the product, the air current should be adjusted to prevent that all the temperatures measured at the measurement points exceed the specified temperature.

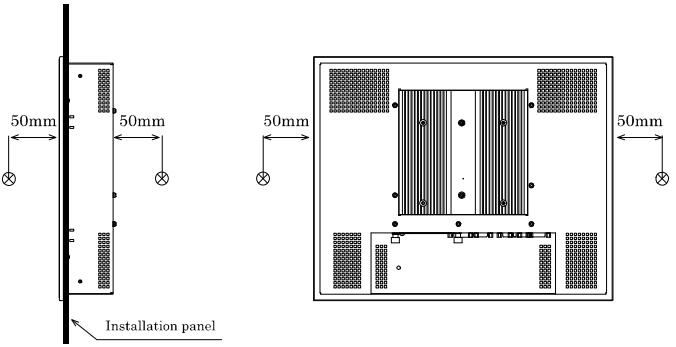
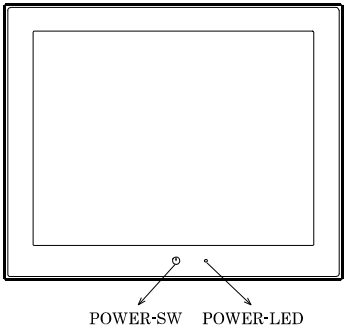


Figure 3.11 Measurement points of ambient temperature

4. Each Component Function

Component Name

Front view



Bottom view

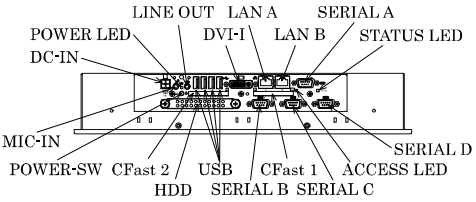


Figure 4.1. Component Name

Table 4.1. Component Function

Name	Function
POWER-SW	Power switch
POWER LED	Power ON display LED
ACCESS LED	HDD disk access display LED
STATUS LED	Status LED
DC-IN	DC power input connector
LINE OUT	Line out (ϕ3.5 PHONE JACK)
MIC IN	Mic in (ϕ3.5 PHONE JACK)
USB	USB port connector x 4
LANA	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
LANB	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
SERIALA	Serial port A connector (9pin D-SUB/male)
SERIALB	Serial port B connector (9pin D-SUB/male)
SERIALC	Serial port C connector (9pin D-SUB/male)
SERIALD	Serial port D connector (9pin D-SUB/male)
DVI-I	Display (29pin female)
CFast1	CFast card slot
CFast2	None
HDD	HDD slot

System Configuration

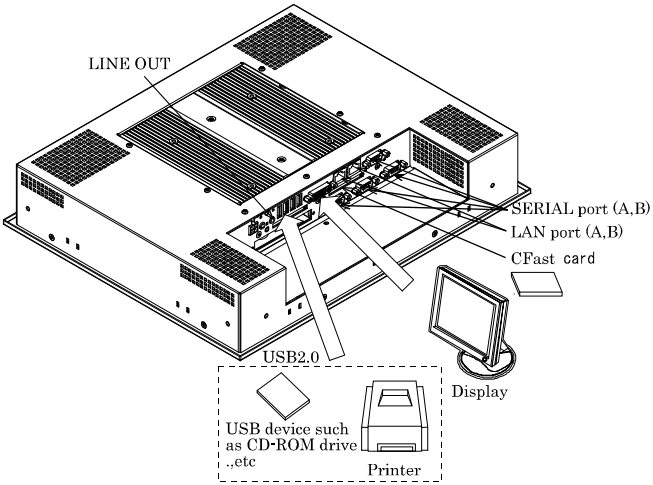


Figure 4.2. System Configuration

Component Function

LED: POWER, ACCESS, STATUS

There are 3 LED in front of this product.

Table 4.2. Display Contents of LED

LED name	State	Display contents
POWER LED	OFF	Indicates that this product is switched off.
	ON (Green)	Indicates that this product is switched on.
ACCESS LED	ON (Orange)	Indicates that the HDD device is being accessed.
STATUS LED	OFF	You can control the behavior of LED from the user application. *1
	Flashing, ON (Red)	You can control the behavior of LED from the user application. *1

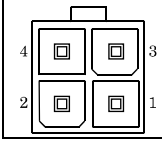
*1 This product does not support *1.

DC Power Input Connector : DC-IN

To supply the power, always use the power supply listed below.

Rated input voltage : 12 - 24VDC
Range of input voltage : 10.8 - 31.2VDC
Power capacity : 12V 5.3A or more, 24V 3.0A or more

Table 4.3. DC Power Connector

Connector type	9360-04P (mfd. by ALEX)	
	Pin No.	Signal name
	1	GND
	2	GND
	3	12 - 24V
	4	12 - 24V

Applicable connector on the connector side

Housing : 9357-04(mfd. by ALEX) or 5557-04R (mfd. by MOLEX)
Contact : 4256T2-LF(AWG18-24) (mfd. by ALEX) or 5556 (AWG18-24) (mfd. by MOLEX)

Applicable connector on the connector side

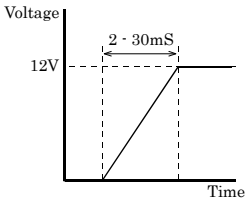


Figure 4.3. Graph of Rise Time of Power Supply

Power switch: POWER SW

POWER SW is provided.

Line out Interface: LINE OUT

A line output connector is provided. You can plug a headphone or amplifier-integrated speakers into this connector.

Mic in Interface: MIC

A line output connector is provided. You can plug a headphone or amplifier-integrated speakers into this connector.

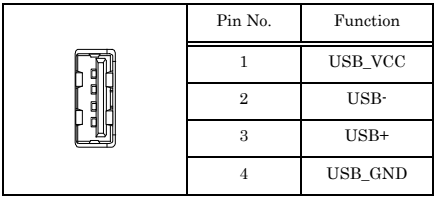
Audio driver

The audio driver is required to use the microphone input and line output interfaces.
Install the appropriate audio driver for your OS from the CONTEC's Web site.

USB Ports: USB

This product is equipped with 4 ports for USB 2.0 interface.

Table 4.4. USB Connector



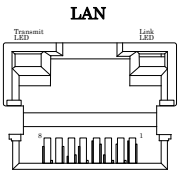
Pin No.	Function
1	USB_VCC
2	USB-
3	USB+
4	USB_GND

Giga bit-Ethernet: LAN A – B

This product is equipped with 2 ports for giga bit.

- Network type : 1000BASE-T/100BASE-TX/10BASE-T
- Transmission speed * : 1000M/100M/10M bps
- Max. network path length : 100m/segment
- Controller : Realtek 8111E (LAN-A/B)

Table 4.5. Giga bit-Ethernet Connector



Pin No.	Function	
	100BASE-TX	1000BASE-T
1	TX+	TRD+(0)
2	TX-	TRD-(0)
3	RX+	TRD+(1)
4	N.C.	TRD+(2)
5	N.C.	TRD-(2)
6	RX-	TRD-(1)
7	N.C.	TRD+(3)
8	N.C.	TRD-(3)

LEDs for display of network statuses:

Right LED : Link LED
Normal connection : Green ON, Operation: Green Blinking
Left LED : Operation LED
10M: Off, 100M : Green, 1000M: Orange

LAN drivers

Install the appropriate LAN driver for your OS from the CONTEC's Web site

⚠ CAUTION

- If you want to use WOL function, please select "Enable" at the item "Enable PME" of OS driver setting.

Serial Port Interface: SERIAL A - D

SERIAL A, B, C, D

The product has 4 ports of RS-232C compliant serial ports supporting up to a baud rate of 115,200bps with a 16-byte transmission-dedicated data buffer and a 16-byte reception-dedicated data buffer. You can use “Chapter 5 BIOS Setup” to configure an I/O address, interrupt and unused state for each of the ports independently. (The same I/O address and IRQ cannot be shared with any other device.)
Please refer to “Chapter 6 I/O Port Addresses” for more information on I/O address and register function.

Table 4.6. SERIAL A, B, C, D I/O Addresses and Interrupts

SERIAL	I/O address	Interrupt
A	3F8h - 3FFh	IRQ 4
B	2F8h - 2FFh	IRQ 3
C	270h-277h	IRQ5
D	278h-27Fh	IRQ7

Table 4.7. Serial Port (A, B Connector)

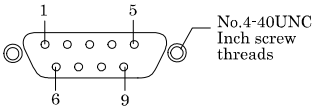
Connector used on the product	9-pin D-SUB (MALE)		
			
Pin No.	Signal name	Meaning	Direction
1	CD	Carrier detect	Input
2	RD	Received data	Input
3	TD	Transmitted data	Output
4	DTR	Data terminal ready	Output
5	GND	Signal ground	-----
6	DSR	Data set ready	Input
7	RTS	Request to send	Output
8	CTS	Clear to send	Input
9	RI	Ring indicator	Input

Table 4.8. Serial Port (C Connector)

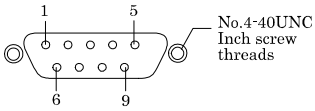
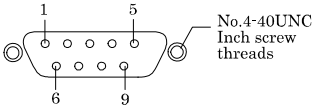
Connector used on the product	9-pin D-SUB (MALE)		
			
Pin No.	Signal name	Signal name	Signal name
	RS232C	RS422	RS485
1	CD	TX-	TX-
2	RD	TX+	TX+
3	TD	RX+	RX-
4	DTR	RX-	RX+
5	GND	GND	GND
6	DSR	RTS-	N.C.
7	RTS	RTS+	N.C.
8	CTS	CTS+	N.C.
9	RI	CTS-	N.C.

Table 4.9. Serial Port (D Connector)

Connector used on the product	9-pin D-SUB (MALE)		
			
Pin No.	Signal name	Signal name	Signal name
	RS232C	RS422	RS485
1	CD	TX-	TX-
2	RD	TX+	TX+
3	TD	RX+	RX-
4	DTR	RX-	RX+
5	GND	GND	GND
6	DSR	N.C.	N.C.
7	RTS	N.C.	N.C.
8	CTS	N.C.	N.C.
9	RI	N.C.	N.C.

RS-422 / RS-485 specifications

Serial port C

- Transmission method: RS-422-/RS-485-compliant asynchronous serial transmission Half duplex/Full duplex
- Baud rate: 50 to 115,200bps (programmable)
- Signal extensible distance: 1.2km (Max.)

Serial port D

- Transmission method: RS-422-/RS-485-compliant asynchronous serial transmission Half duplex/Full duplex
- Baud rate: 50 to 115,200bps(programmable)
- Signal extensible distance: 1.2km (Max.)

Terminating resistance when using RS-422/RS-485

Set terminal resistance using the jumper. When shipped, the unit has no terminating resistance set.

For details, see "Jumper Settings" in Chapter 5.

DVI Interface: DVI

A DVI interface is provided. You can use it to connect a CRT (even a D-SUB 15 pin connector is acceptable by using the bundled DVI-analog RGB adapter) or a CONTEC Panel Link display. The connector is named DVI (DVI-I 29-pin connector).

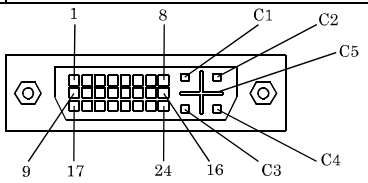
⚠ CAUTION

Precautions when Using Additional Display

- An additional display can be used to enable simultaneous screen display with the PANEL-PC main display.
- If the resolution of the additional display is different from that of the PANEL-PC main display, the size of screen images on the additional display will be decreased or increased with lower image quality.
- When using the main unit and touch panel function at the same time, use a USB connection for the touch panel.

Table 4.10. DVI Connector

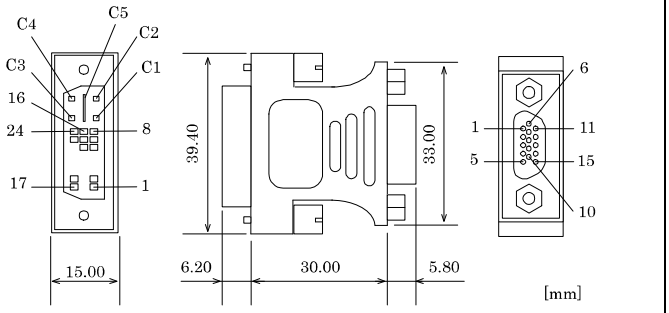
Connector used on the product	DVI-I 29 pin



Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	13	N.C.	C1	RED
2	DATA2+	14	+5V	C2	GREEN
3	DATA2 SHIELD	15	GND	C3	BLUE
4	N.C.	16	HPD	C4	HSYNC
5	N.C.	17	DATA0-	C5	GND
6	DDC CLK	18	DATA0+		
7	DDC DATA	19	DATA0 SHIELD		
8	VSYNC	20	N.C.		
9	DATA1-	21	N.C.		
10	DATA1+	22	DATA0 SHIELD		
11	DATA1 SHIELD	23	CLK+		
12	N.C.	24	CLK-		

Table 4.11. DVI-analog RGB conversion adapter

Connector type	DVI-I 29 pin



Signal on analog RGB

Pin No.	Signal name	Pin No.	Signal name
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N.C.
4	N.C.	12	DDC DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

For the LCDs that can be connected, please refer to “Chapter 7 List of Options”.

Display driver

Install the appropriate display driver for your OS from the CONTEC’s Web site.

⚠ CAUTION

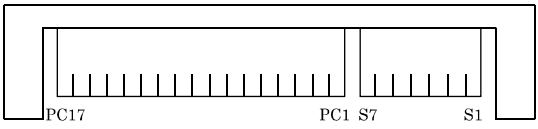
- You need to set the screen resolution if the display cable is not connected to this DVI-D interface at OS startup, but connected after OS startup (hereinafter referred to as “Late Insertion”).
- When the analog display is used, Windows MS-DOS may not be properly displayed in full-screen mode.
  This is because the frequency and resolution of Windows and MS-DOS (full-screen display) are the same due to the screen settings while the display parameters are different.
  For display, as only one parameter can be stored for one frequency or resolution, only either of Windows or MS-DOS screen can be displayed properly.
  In this case, change the resolution or display frequency of Windows so that it is not the same as for the MS-DOS display.

CFast Card Connector (Primary IDE Connection): CFast 1

The CFast Card (Type I) can be connected.
The CFast Card connector doesn't support hot plug. The pulling out opening of the CFast Card cannot be done in the state of power supply ON. Please neither pulling out opening of CFast in the state of power supply ON of this product nor come in contact with CFast. This product may malfunction or cause a failure.

Table 4.12. CFast Card Connector

Connector used on the product	CFast connector



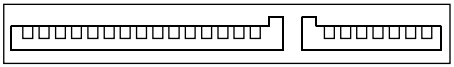
Pin No.	Signal name	Pin No.	Signal name
PC1	CDI	S1	GND
PC2	GND	S2	TX+
PC3	N.C.	S3	TX-
PC4	N.C.	S4	GND
PC5	N.C.	S5	RX-
PC6	N.C.	S6	RX+
PC7	GND	S7	GND
PC8	LED		
PC9	N.C.		
PC10	N.C.		
PC11	N.C.		
PC12	N.C.		
PC13	+3.3V		
PC14	+3.3V		
PC15	GND		
PC16	GND		
PC17	CDO		

Serial-ATA: S-ATA

It has serial-ATA-2.0-compliant controller.

2.5-inch SATA HDD can be connected to an onboard connector.

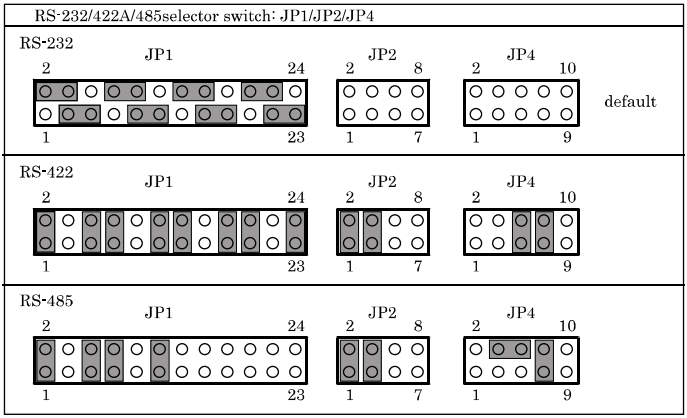
Table 4.13. SATA Connector

Connector used on the product	SATA connector		
			
Pin No.	Signal name	Pin No.	Signal name
PC1	N.C.	S1	GND
PC2	N.C.	S2	TX+
PC3	N.C.	S3	TX-
PC4	GND	S4	GND
PC5	GND	S5	RX-
PC6	GND	S6	RX+
PC7	+5V	S7	GND
PC8	+5V.		
PC9	+5V.		
PC10	GND		
PC11	N.C.		
PC12	GND		
PC13	+12V		
PC14	+12V		
PC15	+12V		

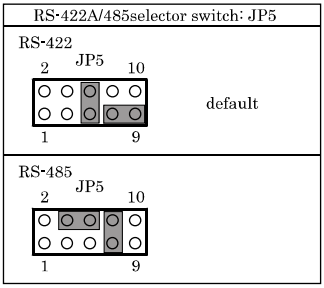
5. Jumper Settings

RS-232/422/485 Selector

Serial port C

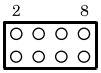
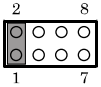
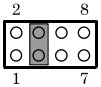
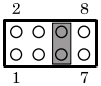
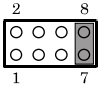


Serial port D

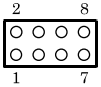
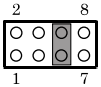
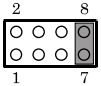


RS-422/485 Terminator

Serial port C

JP3	Terminator	Function
	---	No terminating resister default
	CTS for RS-422	Terminating resister provided 120Ω
	RTS for RS-422	Terminating resister provided 120Ω
	RXD for RS-422/485	Terminating resister provided 120Ω
	TXD for RS-422/485	Terminating resister provided 120Ω

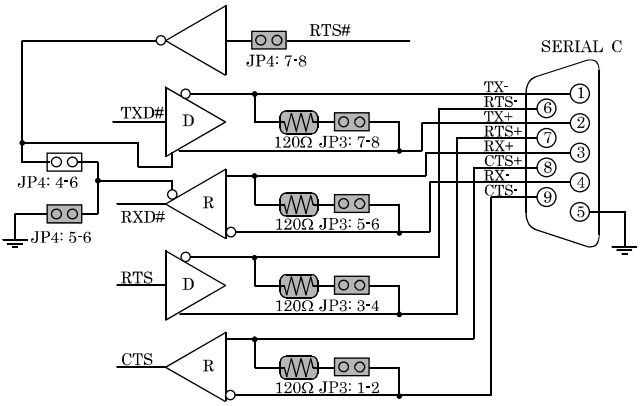
Serial port D

JP2	Terminator	Function
	---	No terminating resister default
	RXD for RS-422/485	Terminating resister provided 120Ω
	TXD for RS-422/485	Terminating resister provided 120Ω

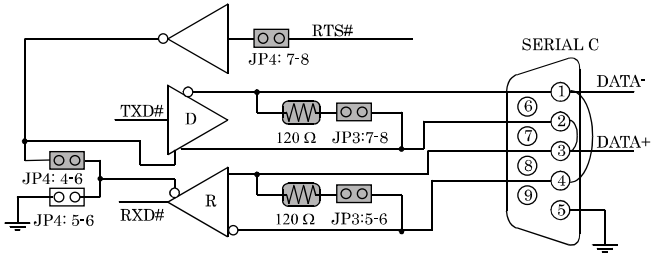
Setting the RS-422 / 485 receiver disable control jumper

Serial port C

- RS-422 Setting

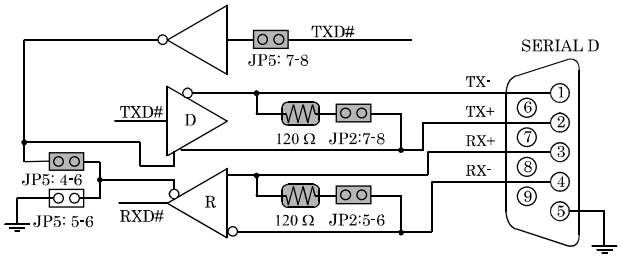


- RS-485 Setting

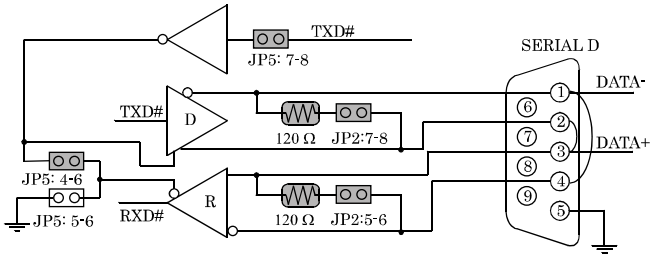


Serial port D

- RS-422 Setting



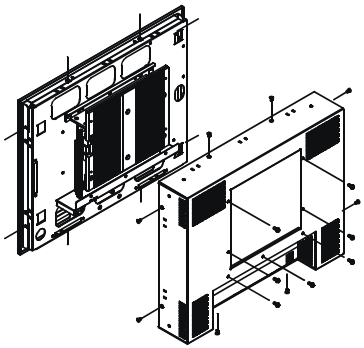
- RS-485 Setting



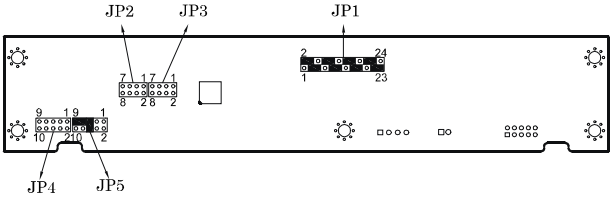
Jumper Configuration

Refer to the instructions below when changing jumper settings.

(1) Remove the screws on the back and remove the back cover.



(2) Change the jumper settings.



6. BIOS Setup

Introduction

This chapter discusses American Megatrends Inc.'s Setup program built into the FLASH ROM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in FLASH ROM so that it retains the Setup information when the power is turned off.

The rest of this chapter is intended to guide you through the process of configuring your system using Setup.

Starting Setup

The BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the FLASH ROM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS are in control, the Setup program can be activated in one of two ways:

1 By pressing <Del> or <F2> immediately after switching the system on, or

2 By pressing the <Del> or <F2> key when the following message appears briefly at the screen during the POST (Power On Self-Test).

```
Press <DEL> or <F2> to enter setup.
```

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON. Restart can be initiated by pressing the <Ctrl>, <Alt>, and <Delete> keys simultaneously.

Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the Page Up and Page Down keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Table 6.1. Using Setup

Key	Function
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the item on the left (menu bar)
Right Arrow	Move to the item on the right (menu bar)
ESC	Main Menu: Quit without saving changes Submenus: Exit Current page to the next higher level menu
Move Enter	Move to the item you desired
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help on Setup navigation keys
F2 key	Load previous settings
F3 key	Load the optimized defaults
F4 key	Save all settings changes to the FLASH ROM and exit

Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> key again.

In Case of Problems

If it is not possible to boot the computer after system settings have been changed and saved during setup, this product will need to be repaired. The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your systems manufacturer to provide the absolute maximum performance and reliability. If chipset settings are changed even slightly, it may become necessary to repair the unit.

A Final Note about Setup

The information in this chapter is subject to change without notice.

Main Menu

Once you enter the AMI BIOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

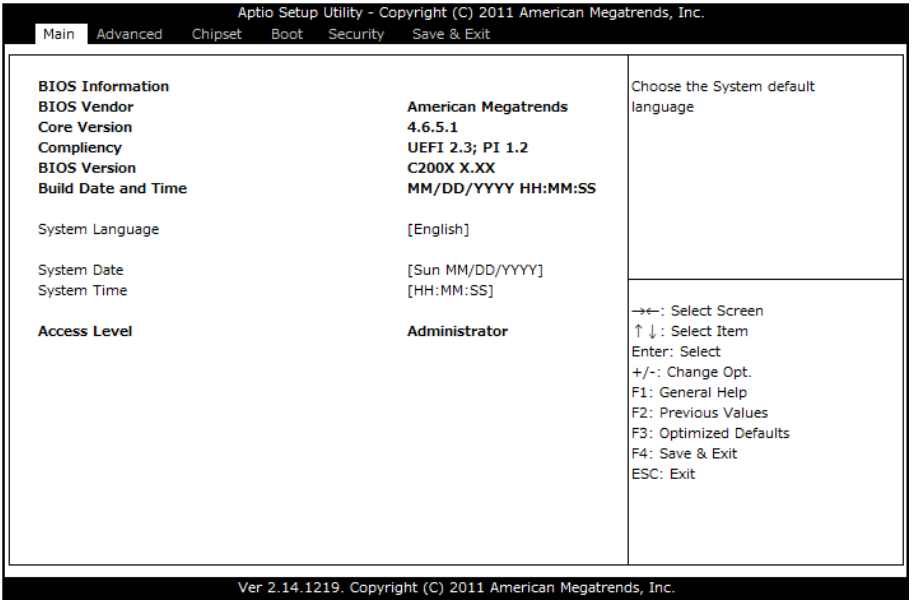


Figure 6.1. Main Manu

Setup Items

The main menu includes the following main setup categories.

- Main
Use this menu to check basic system configuration, and to change system date.

- Advanced
Use this menu to set detailed function available for your system.

- Chipset
Use this menu to specify settings related to the chipset used.

- Boot
Use this menu to specify the boot settings.

- Security
Use this menu to change password to protect the security of your system.

- Save & Exit
Use this menu to load / save the setting, or to exit the setup menu.

Main

Use this menu to check basic system configuration. Settings that can be configured in the Main menu are described in the table below.

Table 6.2. Main Menu (Display only)

Item	General Description	Explanation
Language	English	Set the language used in the Setup Utility.
System Date	Month / Day / Year	Set the system date. The day of the week is set automatically.
System Time	Hour : Minute : Second	Set the system time.
Access Level	Administrator	Display access permissions for the current setup. Items that can be configured depend on access permissions.

Advanced

You can set the detailed function of system. Following items are available.

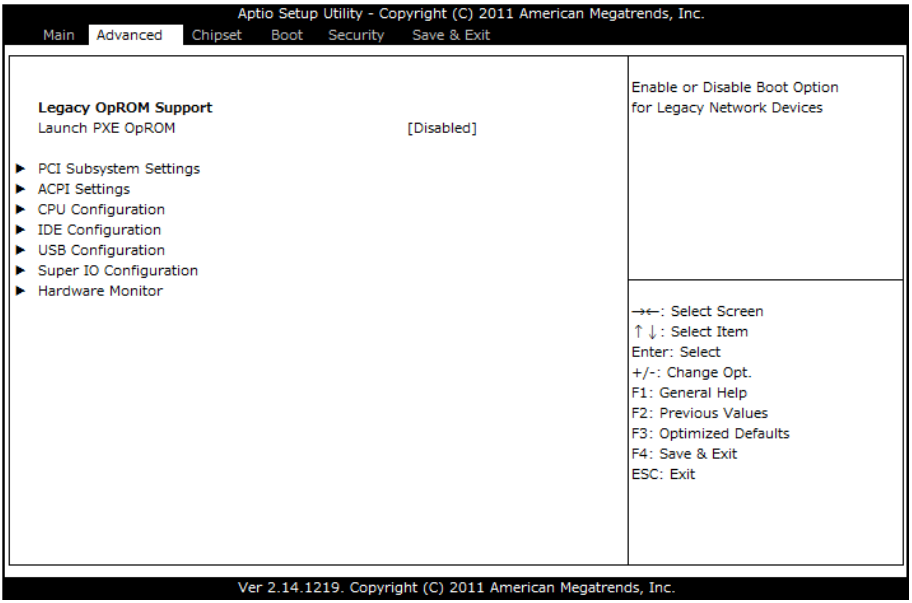


Figure 6.2. Advanced menu

Settings that can be configured in the Advanced menu are described in the table below.

Table 6.3. Advanced Settings

Item	Option	Explanation
Launch PXE OpROM	Disabled [Enabled]	Enable or Disable Boot Option for Legacy Network Devices.

The following sub items are available:

- PCI Subsystem Settings
Use this menu to specify the pci subsystem settings.

- ACPI Settings
Use this menu to specify ACPI power management settings.

- CPU Configuration
Use this menu to specify the cpu configuration.

- IDE Configuration
Use this menu to specify the IDE configuration.

- USB Configuration
Use this menu to specify the usb configuration.

- Super I/O Configuration
Use this menu to specify super I/O configuration, or to check hardware monitor.

- Hardware Monitor
Use this menu to check hardware monitor.

PCI Subsystem Settings

Use this menu to specify PCI subsystem settings.

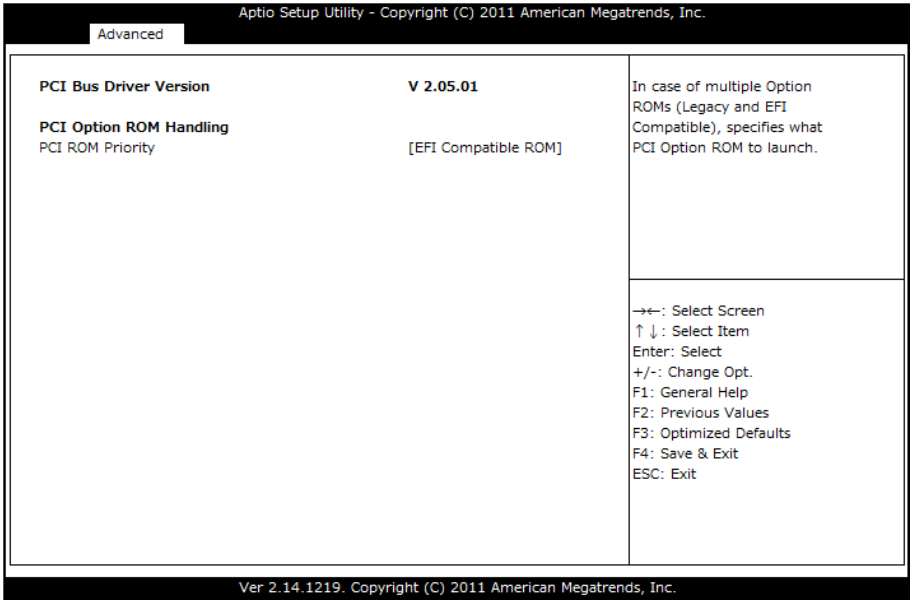

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Advanced
PCI Bus Driver Version
V 2.05.01
PCI Option ROM Handling
PCI ROM Priority
[EFI Compatible ROM]
In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.3. PCI Subsystem Settings

Settings that can be configured in the PCI Subsystem Settings are described in the table below.

Table 6.4. PCI Subsystem Settings

Item	Option	Explanation
PCI ROM Priority	Legacy ROM EFI Compativle ROM	In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.

ACPI Settings

Use this menu to specify ACPI power management settings.

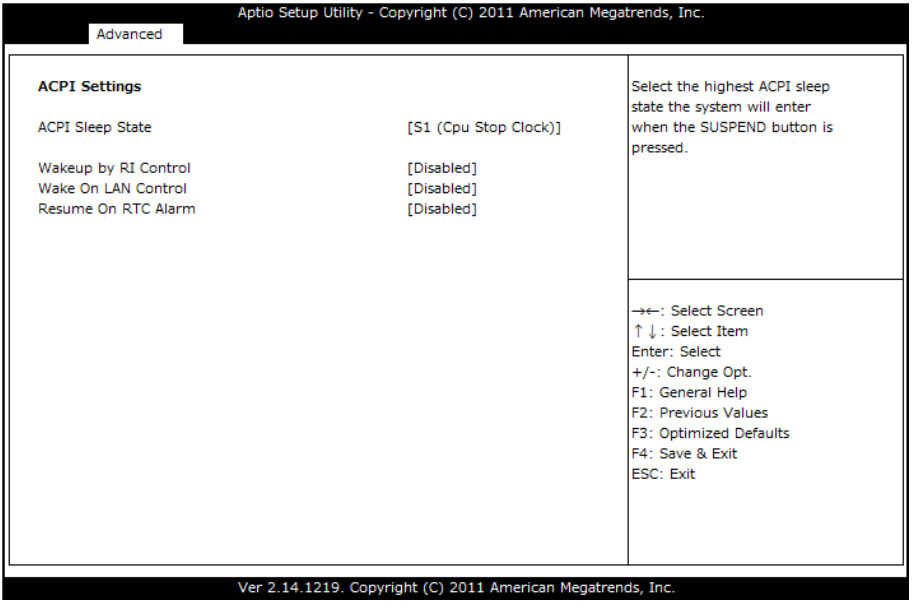


Figure 6.4. ACPI Settings

Settings that can be configured in the ACPI Settings are described in the table below.

Table 6.5. ACPI Settings

Item	Option	Explanation
ACPI Sleep State	Suspend Disabled [S1 (CPU Stop Clock)] S3 (Suspend to RAM)	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
Wakeup by RI Control	[Disabled] Enabled	Enable / Disable Wakeup by Ring function.
Wake On LAN Control	[Disabled] Enabled	Enable / Disable Wake On LAN function.
Resume On RTC Alarm	[Disabled] Enabled	Enable or disable System wake on alarm event. When enabled, System will wake on the hr::min::sec specified.
RTC Wake up Day	0 - 31	Select 0 for daily system wake up. 1-31 for which day of the month that you would like the system to wake up.
RTC Wake up Hour	0 - 23	Select 0 – 23. For example enter 3 for 3am, and 15 for 3pm.
RTC Wake up Minute	0 - 59	Select 0 – 59.
RTC Wake up Second	0 – 59	Select 0 – 59.

CPU Configuration

Use this menu to specify CPU settings.

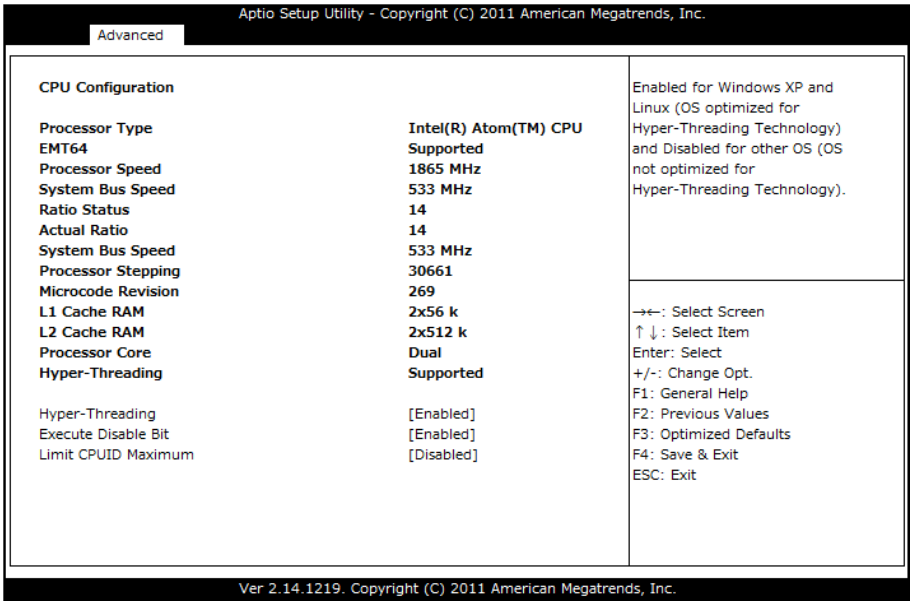


Figure 6.5. CPU Configuration

Settings that can be configured in the CPU Configuration are described in the table below.

Table 6.6. CPU Configuraiton

Item	Option	Explanation
Hyper-Threading	Disabled [Enabled]	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).
Execute Disable Bit	Disabled [Enabled]	XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)
Limit CPUID Maximum	[Disabled] Enabled	Disabled for Windows XP

IDE Configuration

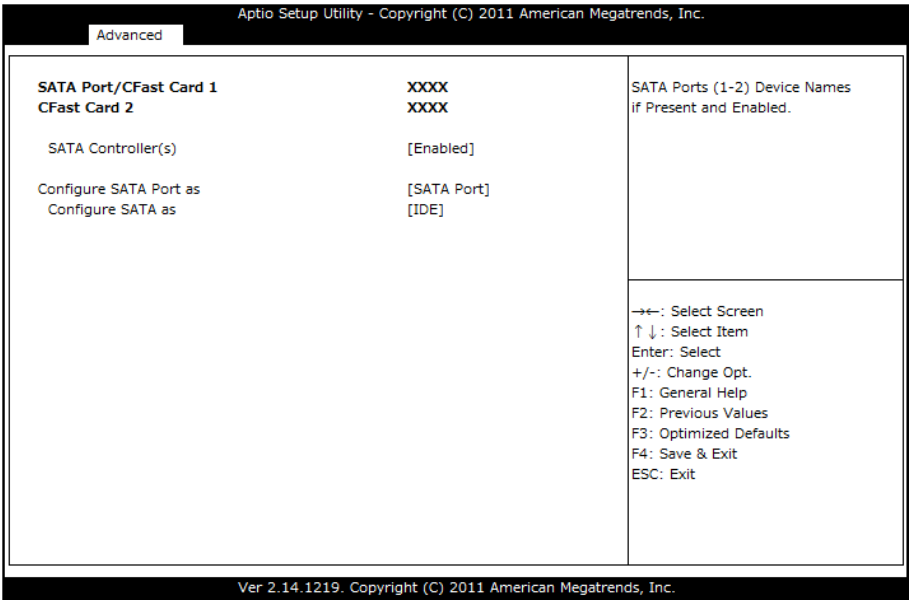


Figure 6.6. IDE Configuration

Settings that can be configured in the IDE Configuration are described in the table below.

Table 6.7. IDE Configuraiton

Item	Option	Explanation
SATA Controller(s)	Disabled [Enabled]	SATA Ports (1-2) Device Names if Present and Enabled.
Configure SATA Port as	[SATA Port] CFast Card	Select a configuration
Configure SATA as	[IDE] AHCI	Select a configuration for SATA Controller.

USB Configuration

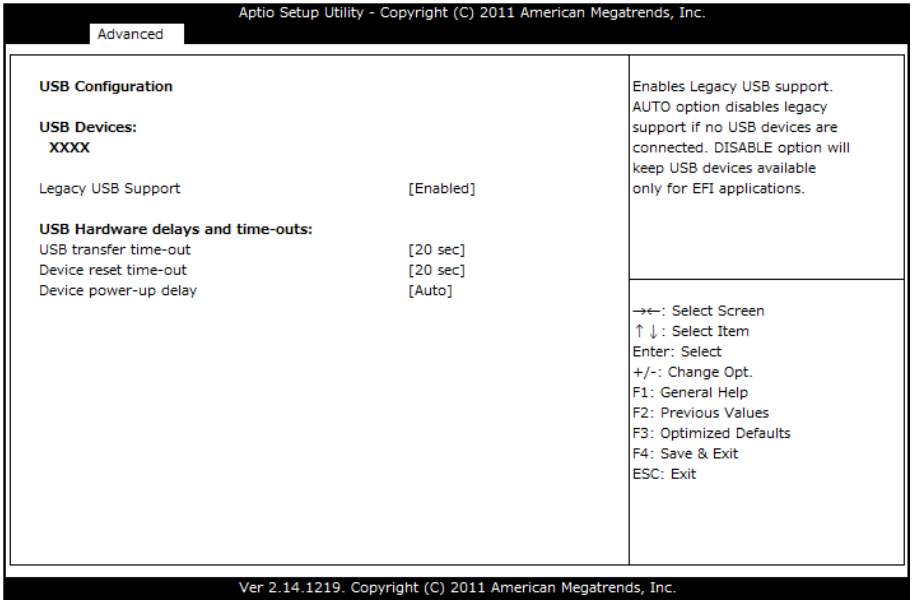

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Advanced
USB Configuration
USB Devices:
XXXX
Legacy USB Support
[Enabled]
USB Hardware delays and time-outs:
USB transfer time-out
[20 sec]
Device reset time-out
[20 sec]
Device power-up delay
[Auto]
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.7. USB Configuration

Settings that can be configured in the USB Configuration are described in the table below.

Table 6.8. USB Configuraiton

Item	Option	Explanation
USB Devices:	1	Show only. Show USB Devices are connected.
Legacy USB Support	[Enabled] Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
USB transfer time-out	1 sec 5 sec 10 sec [20 sec]	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec [20 sec] 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	[Auto] Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.
Device power-up delay in seconds	1..40	Delay range is 1..40 seconds, in one second increments

Super I/O Configuration

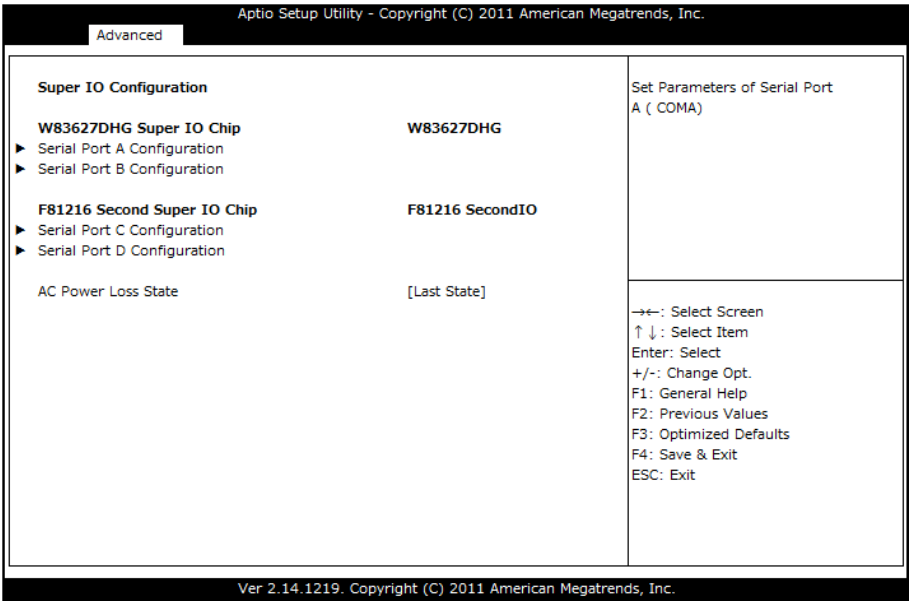


Figure 6.8. Super I/O Configuration

Settings that can be configured in the Super I/O Configuration are described in the table below.

Table 6.9. Super I/O Configuration

Item	Option	Explanation
AC Power Loss State	Always OFF Always ON Last State	Set the state after power loss.

The following sub items are available:

- Serial Port x Configuration (x = A..D)

Use this menu to specify settings for serial ports A to D.

Serial Port A Configuration

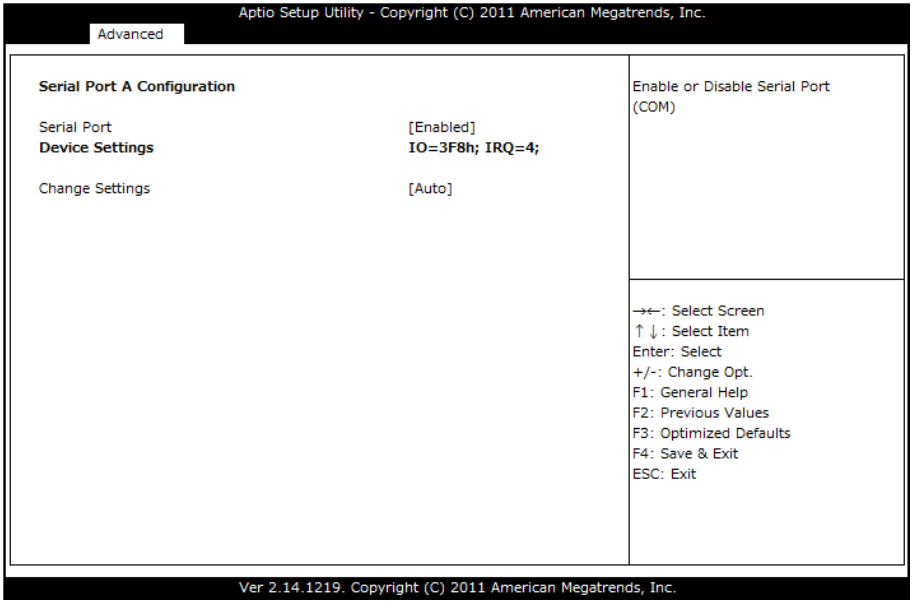


Figure 6.9. Serial Port A Configuration

Settings that can be configured in the Serial Port A Configuration are described in the table below.

Table 6.10. Serial Port A Configuration

Item	Option	Explanation
Serial Port	Disabled [Enabled]	Enable or Disable Serial Port (COM)
Change Settings	[Auto] IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.

Serial Port B Configuration

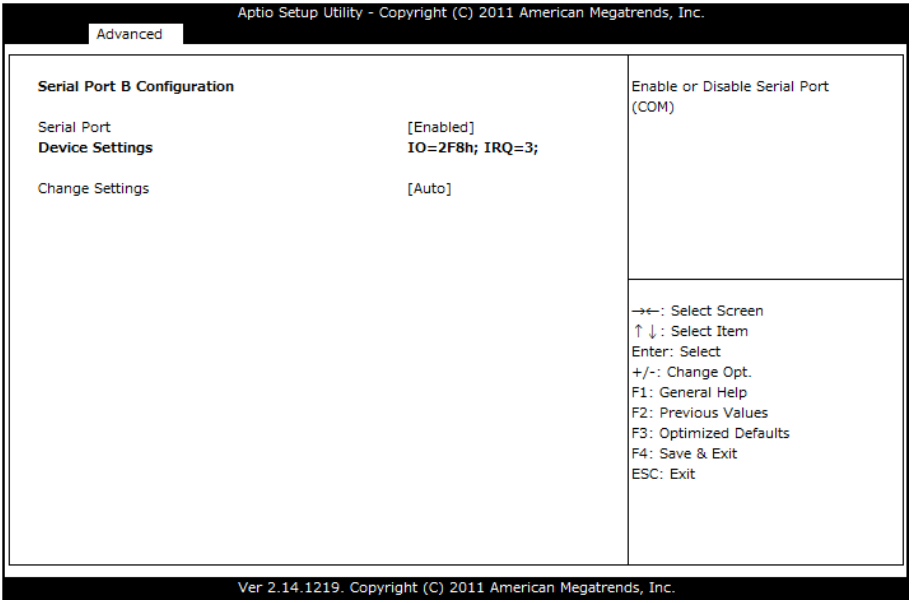


Figure 6.10. Serial Port B Configuration

Settings that can be configured in the Serial Port B Configuration are described in the table below.

Table 6.11. Serial Port B Configuration

Item	Option	Explanation
Serial Port	Disabled [Enabled]	Enable or Disable Serial Port (COM)
Change Settings	[Auto] IO=2F8h; IRQ=3; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.

Serial Port C Configuration

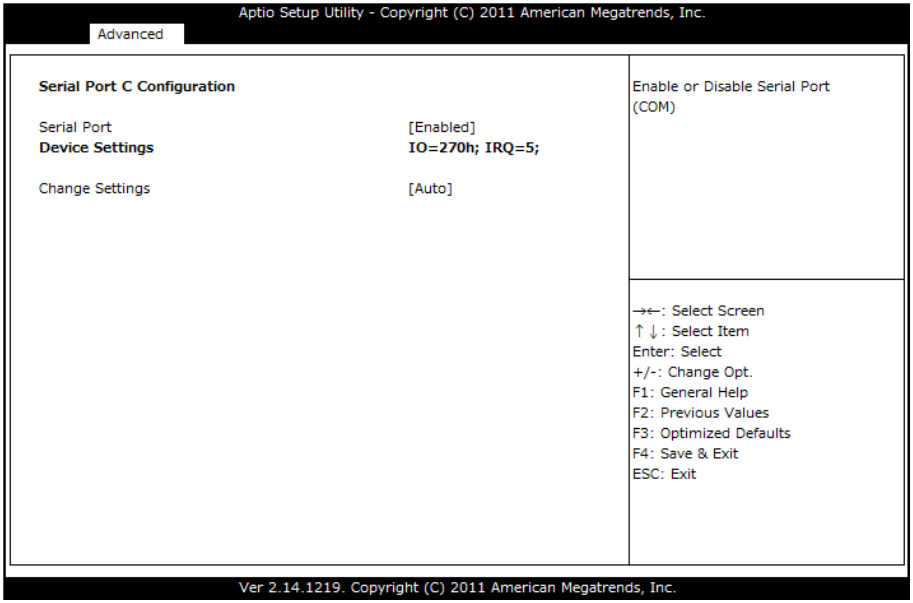


Figure 6.11. Serial Port C Configuration

Settings that can be configured in the Serial Port C Configuration are described in the table below.

Table 6.12. Serial Port C Configuration

Item	Option	Explanation
Serial Port	Disabled [Enabled]	Enable or Disable Serial Port (COM)
Change Settings	[Auto] IO=270h; IRQ=5; IO=260h; IRQ=5,7,10,11; IO=268h; IRQ=5,7,10,11; IO=270h; IRQ=5,7,10,11; IO=278h; IRQ=5,7,10,11;	Select an optimal setting for Super IO device.

Serial Port D Configuration

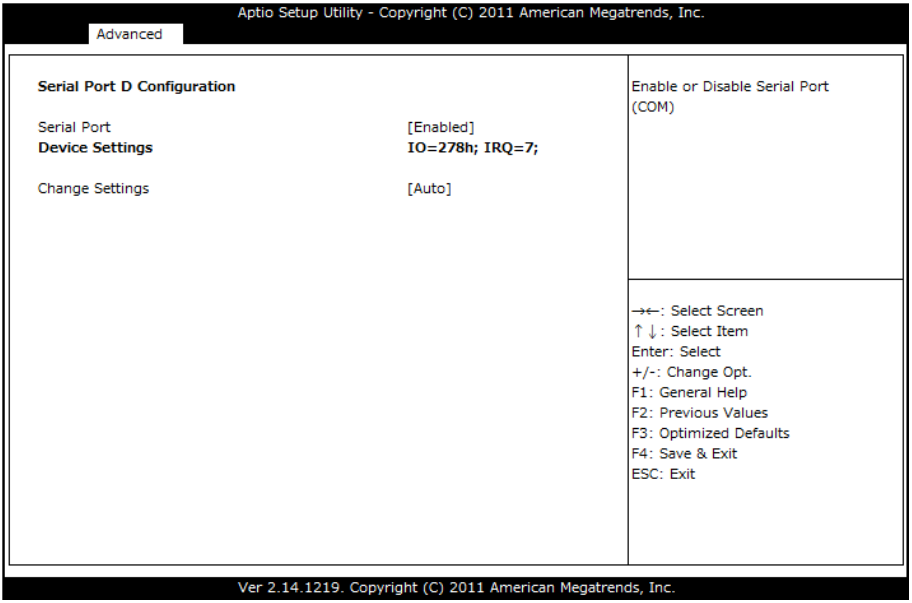


Figure 6.12. Serial Port D Configuration

Settings that can be configured in the Serial Port D Configuration are described in the table below.

Table 6.13. Serial Port D Configuration

Item	Option	Explanation
Serial Port	Disabled [Enabled]	Enable or Disable Serial Port (COM)
Change Settings	[Auto] IO=278h; IRQ=7; IO=260h; IRQ=5,7,10,11; IO=268h; IRQ=5,7,10,11; IO=270h; IRQ=5,7,10,11; IO=278h; IRQ=5,7,10,11;	Select an optimal setting for Super IO device.

Hardware Monitor

Use this menu to check CPU temperature, system temperature, input voltage, and other system conditions.

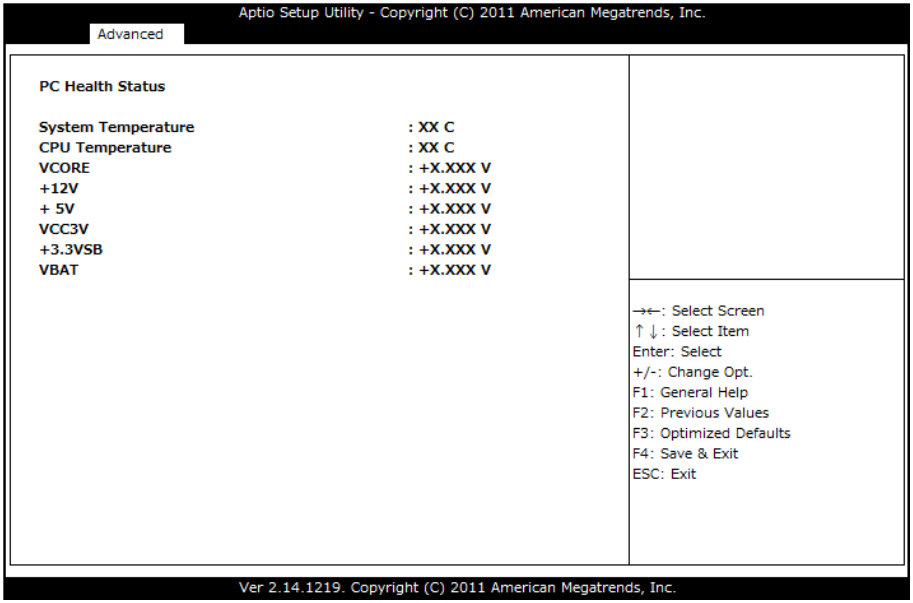

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Advanced
PC Health Status
System Temperature : XX C
CPU Temperature : XX C
VCORE : +X.XXX V
+12V : +X.XXX V
+ 5V : +X.XXX V
VCC3V : +X.XXX V
+3.3VSB : +X.XXX V
VBAT : +X.XXX V
→←: Select Screen
↑ ↓ : Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.13. Hardware Monitor

Chipset

Use this menu to specify advanced chipset settings.

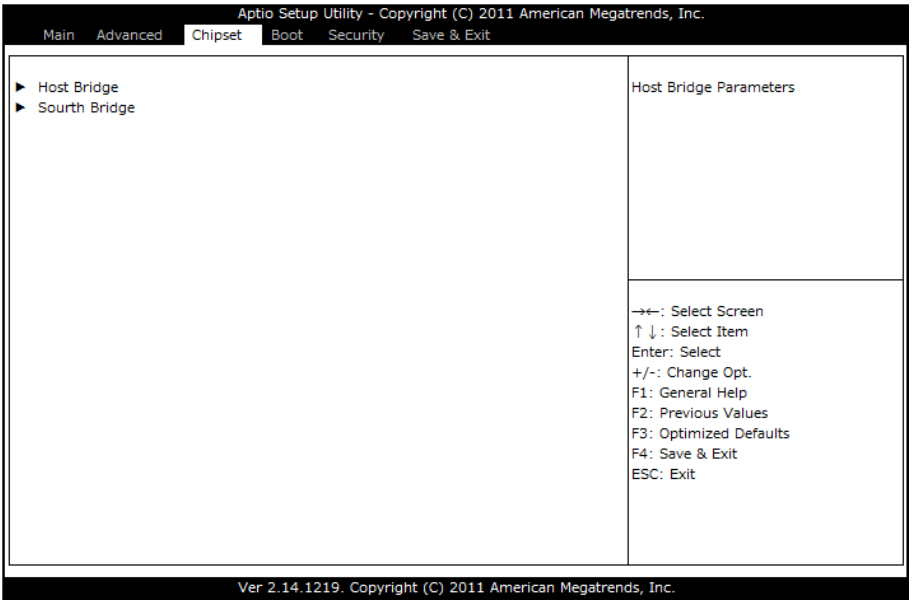

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
▶ Host Bridge
▶ Sourth Bridge
Host Bridge Parameters
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.14. Chipset menu

The following sub items are available:

- Host Bridge

Use this menu to specify the host bridge.

- South Bridge

Use this menu to specify the south bridge.

Host Bridge

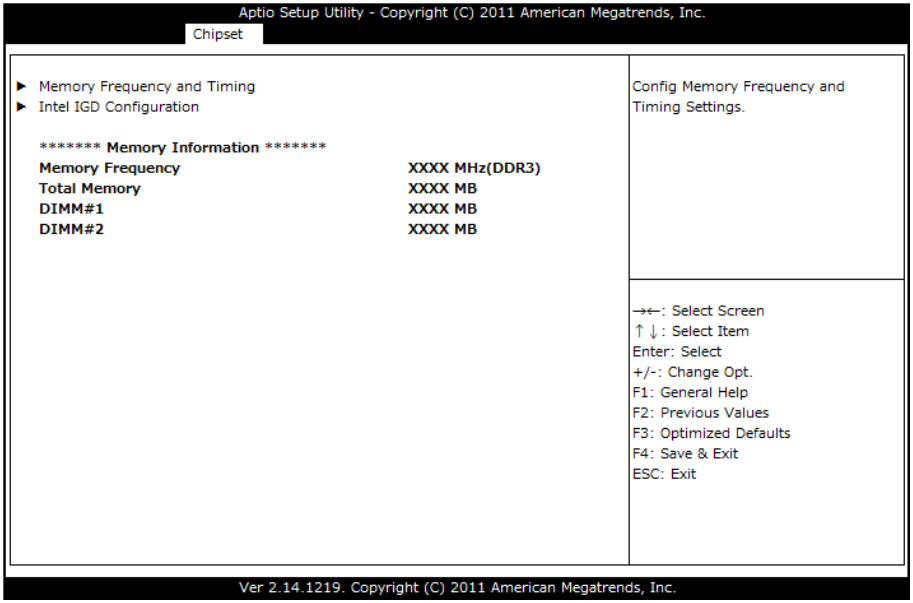

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Chipset
► Memory Frequency and Timing
► Intel IGD Configuration
******* Memory Information *******
Memory Frequency XXXX MHz(DDR3)
Total Memory XXXX MB
DIMM#1 XXXX MB
DIMM#2 XXXX MB
Config Memory Frequency and Timing Settings.
→←: Select Screen
↑ ↓ : Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.15. Host Bridge

The following sub items are available:

- Memory Frequency and Timing

- Intel IGD Configuration

Memory Frequency and Timing

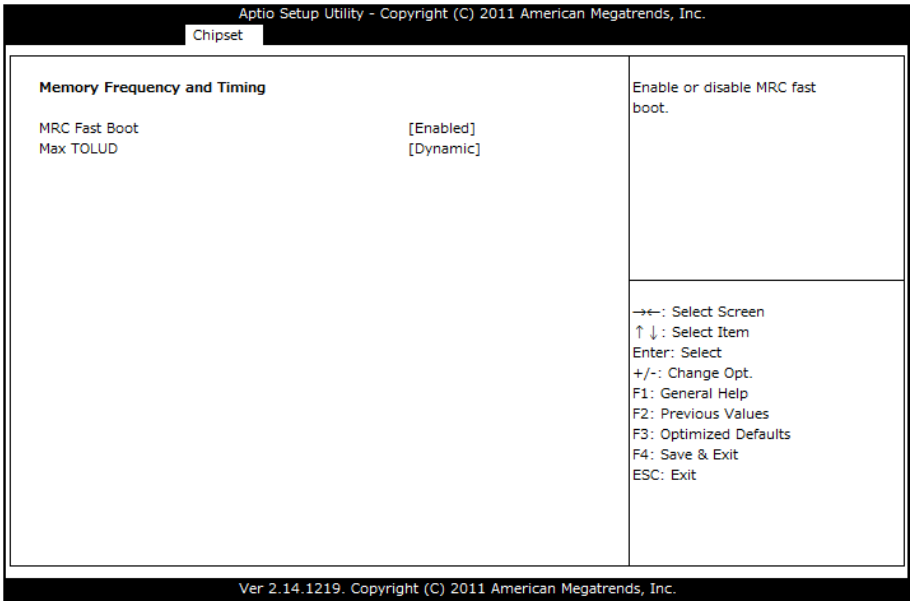


Figure 6.16. Memory Frequency and Timing

Settings that can be configured in the Memory Frequency and Timing are described in the table below.

Table 6.14. Memory Frequency and Timing

Item	Option	Explanation
MRC Fast Boot	Disabled [Enabled]	Enable or disable MRC fast boot.
Max TOLUD	[Dynamic] 1 GB 1.25 GB 1.5 GB 1.75 GB 2 GB 2.25 GB 2.5 GB 2.75 GB 3 GB 3.25 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller

Intel IGD Configuration

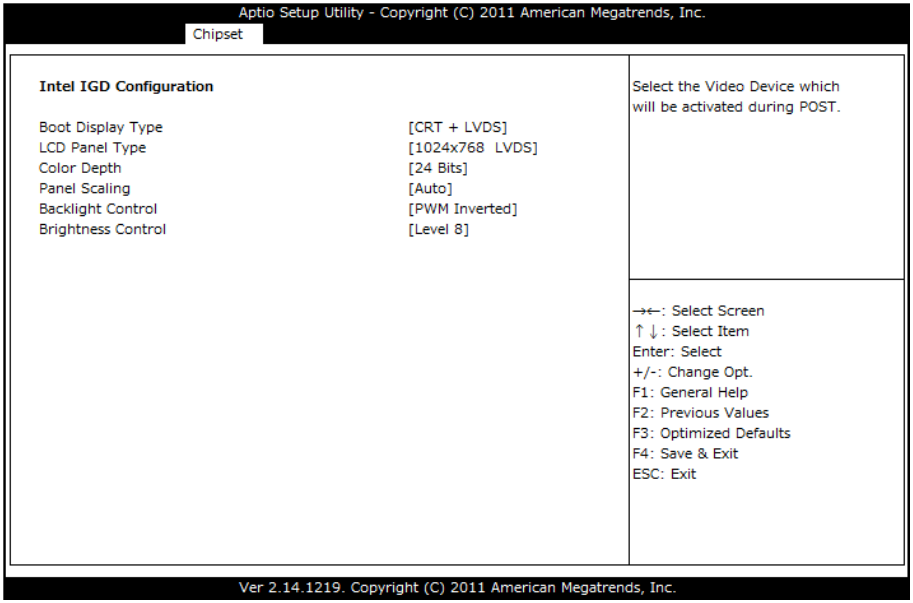

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Chipset
Intel IGD Configuration
Boot Display Type [CRT + LVDS]
LCD Panel Type [1024x768 LVDS]
Color Depth [24 Bits]
Panel Scaling [Auto]
Backlight Control [PWM Inverted]
Brightness Control [Level 8]
Select the Video Device which will be activated during POST.
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.17. Intel IGD Configuration

Settings that can be configured in the Intel IGD Configuration are described in the table below.

Table 6.15. Intel IGD Configuration

Item	Option	Explanation
Boot Display Type	VBIOS Default CRT LVDS DVI [CRT + LVDS] CRT + DVI DVI + LVDS	Select the Video Device which will be activated during POST.
LCD Panel Type	VBIOS Default 640x480 LVDS 800x600 LVDS [1024x768 LVDS] 1280x1024 LVDS 1366x768 LVDS 1440x900 LVDS 1280x800 LVDS 1024x600 LVDS	Select LCD panel used by Internal Graphics Device by electing the appropriate setup item. D2000 series upto 1440x900. N2000 series upto 1366x768.
Color Depth	18 Bits [24 Bits]	Select Color Depth for LVDS1. 24 Bits is only for D2000 series processors.

Item	Option	Explanation
Panel Scaling	[Auto] Force Scaling Off Maintain Aspect Ratio	Select the LCD panel scaling option used by the Internal Graphics Device.
Backlight Control	[PWM Inverted] PWM Normal	Back Light Control Setting
Brightness Control	[Level 8] Level 7 Level 6 Level 5 Level 4 Level 3 Level 2 Level 1	>>Level n: Enabled with Selected Aggressiveness Level. Level 8 is the highest brightness.

South Bridge

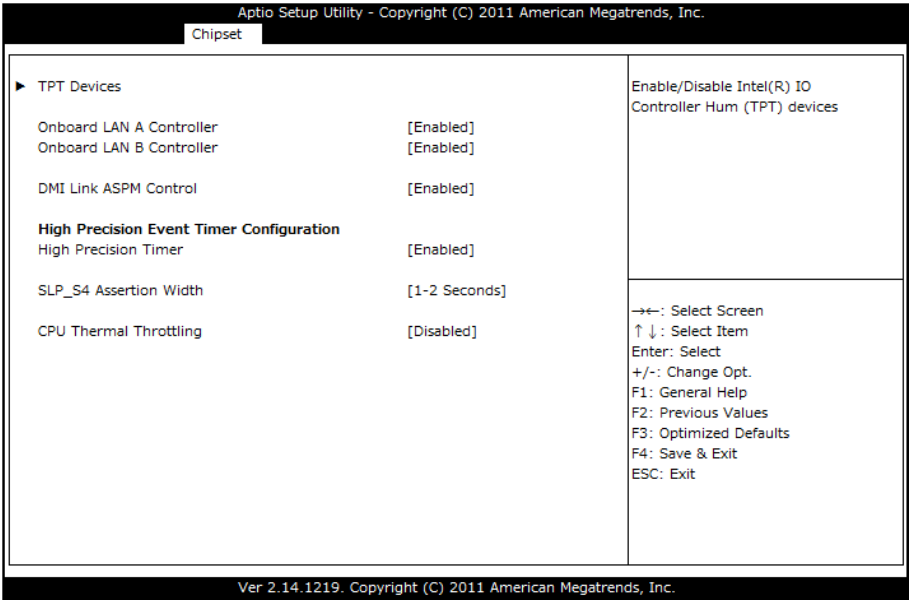

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Chipset
▶ TPT Devices
Onboard LAN A Controller [Enabled]
Onboard LAN B Controller [Enabled]
DMI Link ASPM Control [Enabled]
High Precision Event Timer Configuration
High Precision Timer [Enabled]
SLP_S4 Assertion Width [1-2 Seconds]
CPU Thermal Throttling [Disabled]
Enable/Disable Intel(R) IO Controller Hum (TPT) devices
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.18. South Bridge

Settings that can be configured in the South Bridge are described in the table below.

Table 6.16. South Bridge

Item	Option	Explanation
Onboard LAN A Controller	Disabled [Enabled]	Enable / Disable Onboard LAN A Controller.
Onboard LAN B Controller	Disabled [Enabled]	Enable / Disable Onboard LAN B Controller.
DMI Link ASPM Controll	Disabled [Enabled]	The Control of Active State Power Management on both NB side and SB side of the DMI Link.
High Precision Timer	Disabled [Enabled]	Enable or Disable the High Precision Event Timer.
SLP_S4 Assertion Width	[1-2 Seconds] 2-3 Seconds 3-4 Seconds 4-5 Seconds	Select a minimu assertion width of the SLP_S4# signal
CPU Thermal Throttling	[Disabled] 12.5% 25% 37.5% 50% 62.5% 75% 87.5%	Determines the duty cycle of the throttling when CPU temperature over the threashold value. Threashold value is controlled by CPU Warning Temperature setting.
Threshold Temperature	[Disabled] 50 C/122 F 55 C/131 F 60 C/140 F 65 C/149 F 70 C/158 F 75 C/167 F 70 C 176 F	When CPU temperature over the threshold value, CPU thermal throttling function starts.

The following sub items are available:

- TPT Devices

Use this menu to specify the Intel IO Controller Hub (TPT).

TPT Devices

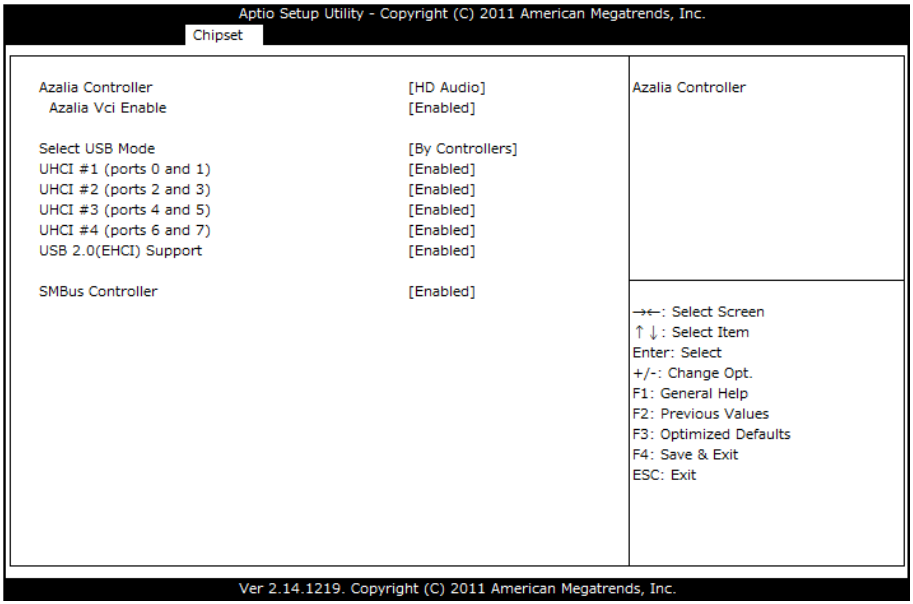

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Chipset
Azalia Controller [HD Audio]
Azalia Vci Enable [Enabled]
Select USB Mode [By Controllers]
UHCI #1 (ports 0 and 1) [Enabled]
UHCI #2 (ports 2 and 3) [Enabled]
UHCI #3 (ports 4 and 5) [Enabled]
UHCI #4 (ports 6 and 7) [Enabled]
USB 2.0(EHCI) Support [Enabled]
SMBus Controller [Enabled]
Azalia Controller
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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Figure 6.19. TPT Devices

Settings that can be configured in the TPT Devices are described in the table below.

Table 6.17. TPT Devices

Item	Option	Explanation
Azalia Controller	Disabled HD Audio	Azalia Controller select.
Azalia Vci Enable	Disabled Enabled	Azalia Controller: HD Audio only. Azalia Supports 1 extended VC, which, when enabled, overrides ICH VCp settings.
Select USB Mode		Select USB mode to control USB ports.
UHCI #1 (ports 0 and 1)	Disabled Enabled	Select USB Mode: By Controller only. Control the USB UHCI (USB 1.1) functions. Disable from highest to lowest controller.
UHCI #2 (ports 2 and 3)	Disabled Enabled	Select USB Mode: By Controller only. Control the USB UHCI (USB 1.1) functions. Disable from highest to lowest controller.
UHCI #3 (ports 4 and 5)	Disabled Enabled	Select USB Mode: By Controller only. Control the USB UHCI (USB 1.1) functions. Disable from highest to lowest controller.
UHCI #4 (ports 6 and 7)	Disabled Enabled	Select USB Mode: By Controller only. Control the USB UHCI (USB 1.1) functions. Disable from highest to lowest controller.
USB Function	Disabled 1 USB Ports 2 USB Ports	Select USB Mode: By Ports only. Enable / Disable USB Function

Item	Option	Explanation
	3 USB Ports 4 USB Ports 5 USB Ports 6 USB Ports 7 USB Ports [8 USB Ports]	
USB 2.0(EHCI) Support	Disabled [Enabled]	Enable or Disable USB 2.0 (EHCI) Support.
SMBus Controller	Disabled [Enabled]	Enable or Disable OnChip SMBus Controller.

Boot

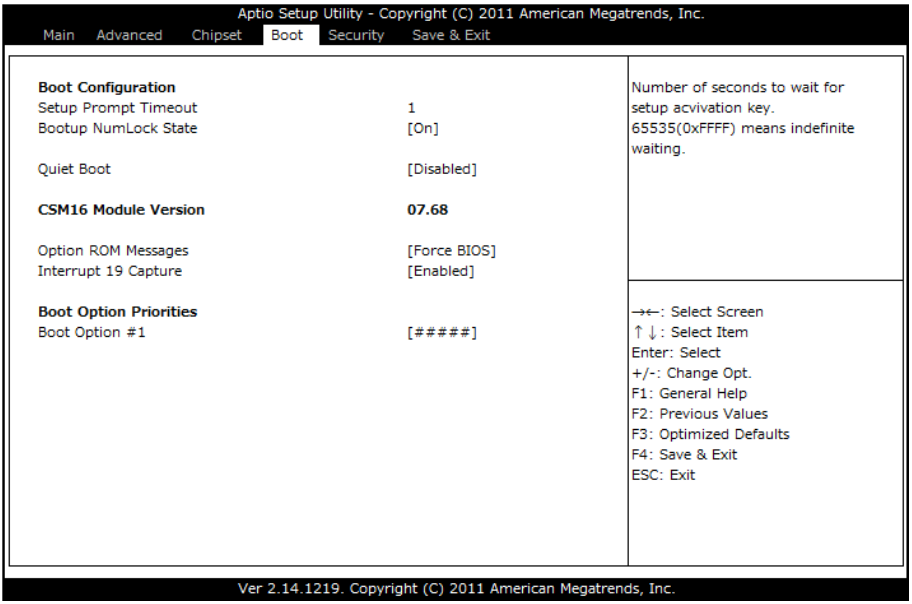

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
Boot Configuration
Setup Prompt Timeout 1
Bootup NumLock State [On]
Quiet Boot [Disabled]
CSM16 Module Version 07.68
Option ROM Messages [Force BIOS]
Interrupt 19 Capture [Enabled]
Boot Option Priorities
Boot Option #1 [#####]
Number of seconds to wait for setup acvivation key. 65535(0xFFFF) means indefinite waiting.
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.20. Boot menu

Use this menu to specify settings related to system startup. The following items are available:

Table 6.18. Boot

Item	Option	Explanation
Setup Prompt Timeout	1 - 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	[On] Off	Select the keyboard NumLock state
Quiet Boot	Enabled [Disabled]	Enables or disables Quiet Boot option
Option ROM Messages	[Force BIOS] Keep Current	Set display mode for Option ROM
Interrupt 19 Capture	Disabled [Enabled]	Enabled: Allows Option ROMs to trap INT 19
Boot Option #x		Sets the system boot order

Security

Use this menu to configure system security settings.

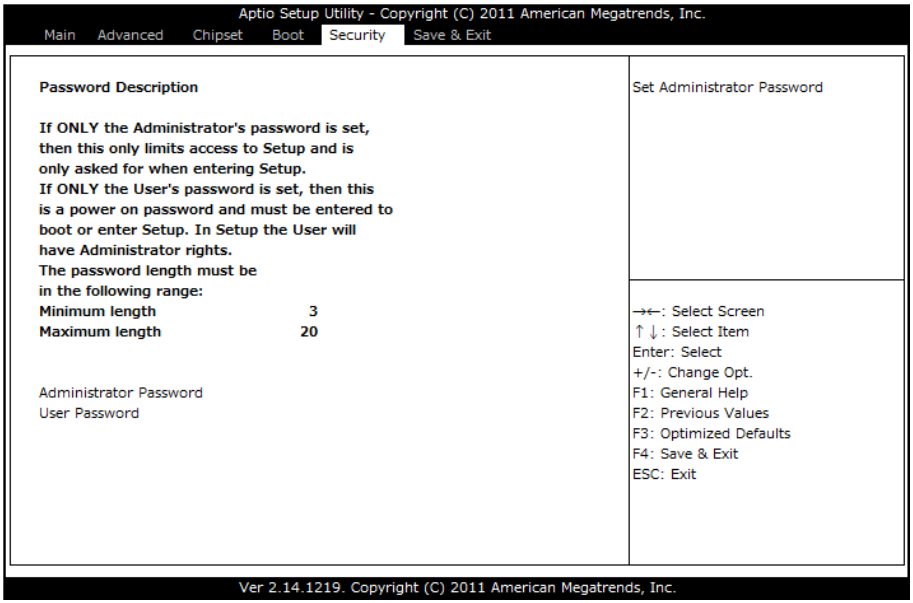

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
Password Description
If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup.
If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights.
The password length must be in the following range:
Minimum length 3
Maximum length 20
Administrator Password
User Password
Set Administrator Password
→←: Select Screen
↑ ↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Ver 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.

Figure 6.21. Security menu

The following items are available:

- Administrator Password

Press Enter key to input password as follows.

Create New Password	[****]
Confirm New Password	[****]

Enter a password of between 3 and 20 characters twice.
If you want to disable password, enter the input menu of “Administrator Password” again.

Enter Current Password	[****]
Create New Password	[]
Confirm New Password	[]

If you input current password to the first form and input no characters to the second and the third form, password will be disabled.

- User Password

Press Enter key to input password as follows.

Create New Password	[****]
Confirm New Password	[****]

Enter a password of between 3 and 20 characters twice.
The procedure for disabling the password is the same as that for the Administrator Password.

Save & Exit

Use this menu to load/save settings changes, and exit the setup menu

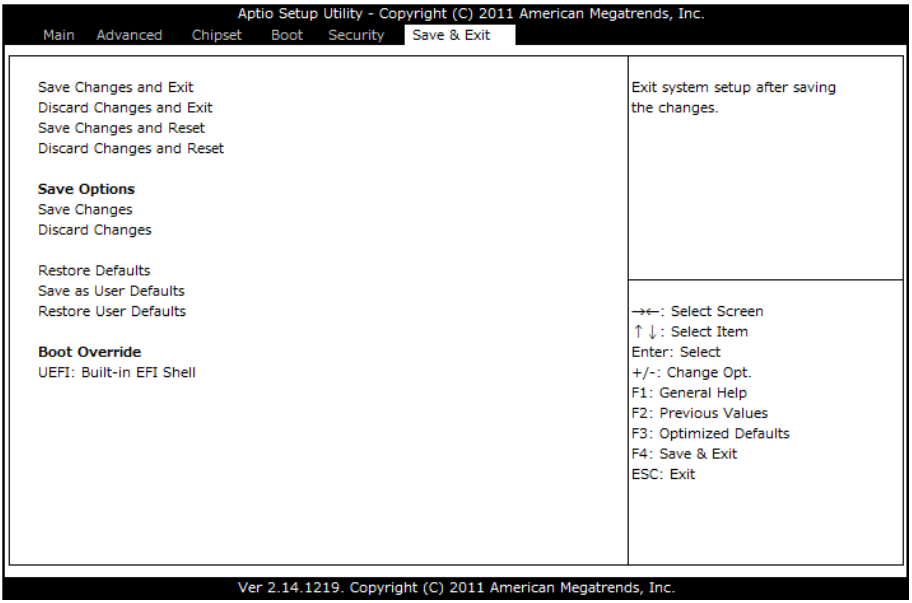


Figure 6.22. Save & Exit menu

The following items are available:

- Save Changes and Exit

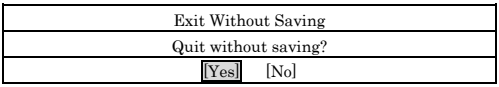
Pressing <Enter> key shows confirmation dialog box, and shows the message below.

Save & Exit Setup
Save configuration and exit?
[Yes] [No]

Pressing [Yes] saves any changes made in FLASH ROM and then restarts the system or continues to boot as necessary. The next time the computer is booted, the BIOS configures the system based on the configuration stored in FLASH ROM.
Pressing [No] lets you go back to setup menu.

- Discard Changes and Exit

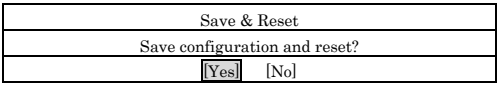
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] continues to boot the system without saving any changes made in FLASH ROM.
Pressing [No] lets you go back to setup menu without storing it in FLASH ROM.

- Save Changes and Reset

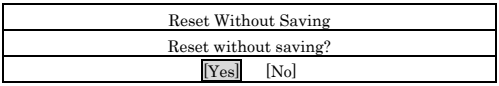
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] saves any changes made in FLASH ROM and reboots the system. The next time the computer is booted, the BIOS configures the system based on the configuration stored in FLASH ROM.
Pressing [No] lets you go back to setup menu.

- Discard Changes and Reset

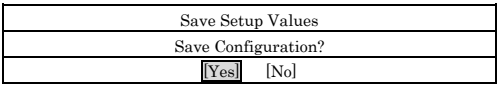
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] reboots the system without saving any changes made in FLASH ROM. Pressing [No] lets you go back to setup menu without storing it in FLASH ROM.

- Save Changes

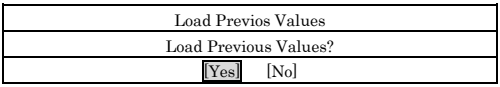
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] saves any changes made in FLASH ROM and takes you back to the setup menu.
Pressing [No] lets you go back to setup menu.

- Discard Changes

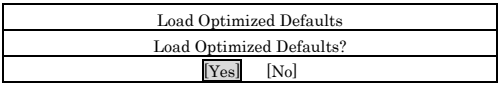
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] discards any changes made and takes you back to the setup menu after loading the previous settings saved in FLASH ROM.
Pressing [No] lets you go back to setup menu.

- Restore Defaults

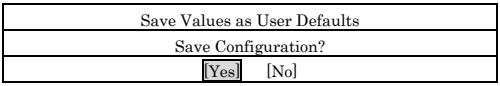
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] loads the default values that are factory settings for optimal performance system operations. This setting will not be stored in FLASH ROM before saving it.
Pressing [No] lets you go back to setup menu without loading it.

- Save as User Defaults

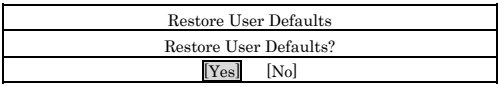
Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] saves the current settings as the user default settings in FLASH ROM and takes you back to the setup menu.
Pressing [No] lets you go back to setup menu.

- Restore User Defaults

Pressing <Enter> key shows confirmation dialog box, and shows the message below.



Pressing [Yes] loads the settings saved in FLASH ROM as the user default settings and takes you back to the setup menu. This setting will not be stored in FLASH ROM before saving it.
Pressing [No] lets you go back to setup menu.

- Boot Override

Using the cursor to select the device that you want to start and pressing <Enter> key directly boots the selected device regardless of the order set in the Boot menu.

POST Beep

POST Beep indicates that a video error has occurred, or that no memory is installed. It indicates the BIOS cannot initialize the video screen to display any additional information.

7. Appendix

Memory Map

Table 7.1. Memory Map

Memory Segments	Comments
00000h - 9FFFh	0 - 640K DOS Region
A0000h – BFFFFh	Video Buffer
B0000h - B7FFFh	Monochrome Adapter range
C0000h – CFFFFh	Video BIOS
D0000h – DFFFFh	Expansion Area
E0000h – EFFFFh	Extended System BIOS Area
F0000h – FFFFFh	System BIOS Area
100000h – FFFFFFFFh	Extended Memory Area
100000h - Top of Main Memory	Main DRAM Address Range
Top of Main Memory	Extended SMRAM Address Range
Top of Main Memory To 4GB	PCI Memory Address Range
FEC0000h - FECFFFFFh,	APIC Configuration space
FFE00000h – FFFFFFFFh	High BIOS Area

I/O Port Addresses

Table 7.2. I/O Port Addresses < *1 / 2* >

Address	Size	Description
0000 - 001F	32 bytes	DMA controller
0020 - 0021	2 bytes	Interrupt controller
0024 - 0025	2 bytes	Interrupt controller
0028 - 0029	2 bytes	Interrupt controller
002C – 002D	2 bytes	Interrupt controller
002E – 002F	2 bytes	LPC SIO
0030 – 0031	2 bytes	Interrupt controller
0034 - 0035	2 bytes	Interrupt controller
0038 - 0039	2 bytes	Interrupt controller
003C – 003D	2 bytes	Interrupt controller
0040 - 0043	4 bytes	Timer / Counter
004E – 004F	2 bytes	LPC SIO
0050 - 0053	4 bytes	Timer / Counter
0060	1 byte	Microcontroller / Keyboard controller
0061	1 byte	NMI controller
0062	1 byte	Microcontroller
0064	1 byte	Microcontroller / Kerboard controller
0066	1 byte	Microcontroller
0070 - 0077	8 bytes	NMI / RTC Controller
0080 – 0091	18 bytes	DMA controller / LPC / PCI
0092	1 byte	Reset Generator
0093 – 009F	13 bytes	DMA controller
00A0 – 00A1	2 bytes	Interrupt controller
00A4 – 00A5	2 bytes	Interrupt controller
00A8 – 00A9	2 bytes	Interrupt controller
00AC – 00AD	2 bytes	Interrupt controller
00B0 – 00B1	2 bytes	Interrupt controller
00B2 – 00B3	2 bytes	Power Management
00B4 – 00B5	2 bytes	Interrupt controller
00B8 – 00B9	2 bytes	Interrupt controller
00BC – 00BD	2 bytes	Interrupt controller
00C0 – 00DF	32 bytes	DMA controller
00F0	1 byte	Interrupt controller
0170 - 0177	8 bytes	IDE / SATA controller, PCI
01F0 – 01F7	8 bytes	IDE / SATA controller, PCI
0200 – 020F	16 bytes	Reserved
0260 - 0267	8 bytes	Reserved
0268 – 026F	8 bytes	Reserved
0270 – 0277	8 bytes	COM C
0278 – 027F	8 bytes	COM D
02F8 – 02FF	8 bytes	COM B
0376	1 byte	IDE / SATA controller, PCI
03B0 – 03BB	13 bytes	Graphics
03C0 – 03DF	32 bytes	Graphics

Table 7.2. I/O Port Addresses < *2 / 2* >

Address	Size	Description
03F6	1 byte	IDE / SATA controller, PCI
03F8 – 03FF	8 bytes	COM A
0400 – 043F	64 bytes	Power management
04D0 – 04D1	2 bytes	Interrupt controller
0500 – 053F	64 bytes	GPIO / Reserved
0CF9	1 byte	Reset Generator
0D00 – 0FFFF	62208 bytes	PCI Bus

Interrupt Level List

Table 7.3. Hardware Interrupt Levels (Factory Settings)

Type	8259	Priority	Description	Vector
NMI		High	-I/O CHK	02H
IRQ0	MASTER	↑	Timer 0	08H
IRQ1	"	|	Reserved	09H
IRQ2	"	|	Interrupt Controller 2 (Slave)	0AH
IRQ8	SLAVE	|	Realtime Clock	70H
IRQ9	"	|	Reserved	71H
IRQ10	"	|	Reserved	72H
IRQ11	"	|	Reserved	73H
IRQ12	"	|	Reserved	74H
IRQ13	"	|	Co-processor	75H
IRQ14	"	|	Not used	76H
IRQ15	"	|	Not used	77H
IRQ3	MASTER	|	Serial port B	0BH
IRQ4	"	|	Serial port A	0CH
IRQ5	"	|	Serial port C	0DH
IRQ6	"	↓	Not used	0EH
IRQ7	"	Low	Serial port D	0FH

POST Codes

Table 7.4. POST Codes < *1 / 3* >

POST (hex)	Description
< Security (SEC) phase >	
1h	Power on. Reset type detection (software / hardware)
2h	AP initialization before microcode loading
3h	North Bridge initialization before microcode loading
4h	South Bridge initialization before microcode loading
5h	OEM initialization before microcode loading
6h	Microcode loading
7h	AP initialization after microcode loading
8h	North Bridge initialization after microcode loading
9h	South Bridge initialization after microcode loading
Ah	OEM initialization after microcode loading
Bh	Cache initialization
< Pre-EFI Initialization (PEI) phase >	
10h	PEI Core is started
11h	Pre-memory CPU initialization is started
12h – 14h	Pre-memory CPU initialization (CPU module specific)
15h	Pre-memory North Bridge initialization is started
16h – 18h	Pre-Memory North Bridge initialization (North Bridge module specific)
19h	Pre-memory South Bridge initialization is started
1Ah – 1Ch	Pre-memory South Bridge initialization (South Bridge module specific)
1Dh – 2Ah	OEM pre-memory initialization codes
2Bh	Memory initialization. Serial Presence Detect (SPD) data reading
2Ch	Memory initialization. Memory presence detection
2Dh	Memory initialization. Programming memory timing information
2Eh	Memory initialization. Configuring memory
2Fh	Memory initialization (other).
30h	Reserved for ASL (see ASL Status Codes section below)
31h	Memory Installed
32h	CPU post-memory initialization is started
33h	CPU post-memory initialization. Cache initialization
34h	CPU post-memory initialization. Application Processor(s) (AP) initialization
35h	CPU post-memory initialization. Boot Strap Processor (BSP) selection
37h	CPU post-memory initialization. System Management Mode (SMM) initialization
38h	Post-Memory North Bridge initialization is started
39h – 3Ah	Post-Memory North Bridge initialization (North Bridge module specific)
3Bh	Post-Memory South Bridge initialization is started
3Ch – 3Eh	Post-Memory South Bridge initialization (South Bridge module specific)
3Fh – 4Eh	OEM post memory initialization codes
4Fh	DXE IPL is started
< Driver Execution Environment (DXE) phase >	
60h	DXE Core is started
61h	NVRAM initialization
62h	Installation of the South Bridge Runtime Services
63h	CPU DXE initialization is started
64h-67h	CPU DXE initialization (CPU module specific)
68h	PCI host bridge initialization
69h	North Bridge DXE initialization is started
6Ah	North Bridge DXE SMM initialization is started

Table 7.4. POST Codes < *2 / 3* >

POST (hex)	Description
6Bh - 6Fh	North Bridge DXE initialization (North Bridge module specific)
70h	South Bridge DXE initialization is started
71h	South Bridge DXE SMM initialization is started
72h	South Bridge devices initialization
73h – 77h	South Bridge DXE Initialization (South Bridge module specific)
78h	ACPI module initialization
79h	CSM initialization
7Ah – 7Fh	Reserved for future AMI DXE codes
80h – 8Fh	OEM DXE initialization codes
90h	Boot Device Selection (BDS) phase
91h	Driver connecting is started
92h	PCI Bus initialization is started
93h	PCI Bus Hot Plug Controller Initialization
94h	PCI Bus Enumeration
95h	PCI Bus Request Resources
96h	PCI Bus Assign Resources
97h	Console Output devices connect
98h	Console Input devices connect
99h	Super IO Initialization
9Ah	USB initialization is started
9Bh	USB Reset
9Ch	USB Detect
9Dh	USB Enable
9Eh – 9Fh	Reserved for future AMI codes
A0h	IDE initialization is started
A1h	IDE Reset
A2h	IDE Detect
A3h	IDE Enable
A4h	SCSI initialization is started
A5h	SCSI Reset
A6h	SCSI Detect
A7h	SCSI Enable
A8h	Setup Verifying Password
A9h	Start of Setup
AAh	Reserved for ASL (see ASL Status Codes section below)
ABh	Setup Input Wait
ACh	Reserved for ASL (see ASL Status Codes section below)
ADh	Ready To Boot event
AEh	Legacy Boot event
AFh	Exit Boot Services event
B0h	Runtime Set Virtual Address MAP Begin
B1h	Runtime Set Virtual Address MAP End
B2h	Legacy Option ROM Initialization
B3h	System Reset
B4h	USB hot plug
B5h	PCI bus hot plug
B6h	Clean-up of NVRAM
B7h	Configuration Reset (reset of NVRAM settings)
B8h - BFh	Reserved for future AMI codes
C0h - CFh	OEM BDS initialization codes

Table 7.4. POST Codes < *3 / 3* >

POST(hex)	Description
ACPI/ASL Checkpoints	
01h	System is entering S1 sleep state
02h	System is entering S2 sleep state
03h	System is entering S3 sleep state
04h	System is entering S4 sleep state
05h	System is entering S5 sleep state
10h	System is waking up from the S1 sleep state
20h	System is waking up from the S2 sleep state
30h	System is waking up from the S3 sleep state
40h	System is waking up from the S4 sleep state
ACh	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
AAh	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

SERIAL I/O Address and Register Function

The following table lists the I/O addresses in case of SERIAL A.

Table 7.5. I/O Address

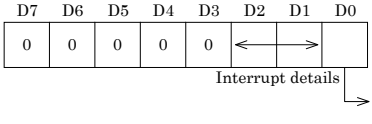
I/O address	DLAB	Read/Write	Register	
03F8H	0	W	Transmitter holding register	THR
		R	Receive buffer register	RBR
	1	W	Divisor latch register (LSB)	DLL
03F9H	1	W	Divisor latch register (MSB)	DLM
	0	W	Interrupt enable register	IER
03FAH	X	R	Interrupt ID register	IIR
03FBH	X	W	Line control register	LCR
03FCH	X	W	Modem control register	MCR
03FDH	X	R	Line status register	LSR
03FEH	X	R	Modem status register	MSR
03FFH	X	R/W	Scratch register	SCR

DLAB (Divisor Latch Access Bit) : The value in bit 7 of the line control register.

Table 7.6. Function of Each Register < *1 / 4* >

I/O address	Description
03F8H	THR: Transmitter Holding Register [DLAB=0] D7 D6 D5 D4 D3 D2 D1 D0 bit7 MSB ← → bit0 LSB Register dedicated to write transmitted data to
03F8H	RBR: Reciever Buffer Register [DLAB=O] D7 D6 D5 D4 D3 D2 D1 D0 bit7 MSB ← → bit0 LSB Register dedicated to read received data from
03F8H	DLL: Divisor Latch (LSB) [DLAB=1] D7 D6 D5 D4 D3 D2 D1 D0 bit7 MSB ← → bit0 LSB Baud rate setting register (LSB)
03F9H	DLH: Divisor Latch (MSB) [DLAB=1] D7 D6 D5 D4 D3 D2 D1 D0 bit7 MSB ← → bit0 LSB Baud rate setting register (MSB)
03F9H	IER: Interrupt Enable Register [DLAB=0] D7 D6 D5 D4 D3 D2 D1 D0 0 0 0 0 EMS ELSI ETHREI ERDAI ERDAI: Received data Interrupt enable ETHREI: Received data register empty Interrupt enable ELSI: Receiver line status Interrupt enable EMS: Modem status interrupt enable [Always used at 0.] 1: Enable interrupt 0: Disable interrupt

Table 7.6. Function of Each Register < *2 / 4* >

<table>
<tr><th>I/O address</th><th>Description</th></tr>
<tr><td>03FAH</td><td>
IIR : Interrupt Identification Register


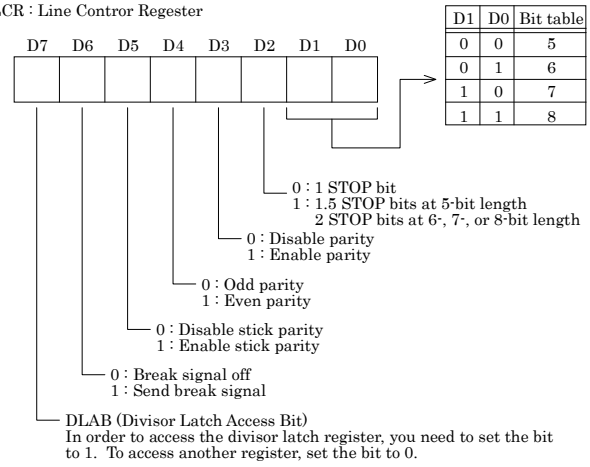
<table>
<tr><th>bit2</th><th>bit1</th><th>bit0</th><th>Priority</th><th>Description</th></tr>
<tr><td>0</td><td>0</td><td>1</td><td>——</td><td>Interrupts are not generated.</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1 (high)</td><td>Generated by overrun, parity, framing error or break interrupt.
Cleared when the line status register is read.</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>2</td><td>Generated when the receive buffer register is ready.
Cleared when the receiving buffer is read.</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>3</td><td>Generated when the transmitter holding register is empty. Cleared when the IIR is read or when transmitted data is written to THR.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>4 (low)</td><td>Modem status interrupt is generated.
(CTS, DSR, RI, CD)
Cleared when the modem status register is read.</td></tr>
</table>
</td></tr>
<tr><td>03FBH</td><td>
LCR : Line Contror Regester

D7 D6 D5 D4 D3 D2 D1 D0
D1 D0 Bit table
0 0 5
0 1 6
1 0 7
1 1 8
0 : 1 STOP bit
1 : 1.5 STOP bits at 5-bit length
2 STOP bits at 6-, 7-, or 8-bit length
0 : Disable parity
1 : Enable parity
0 : Odd parity
1 : Even parity
0 : Disable stick parity
1 : Enable stick parity
0 : Break signal off
1 : Send break signal
DLAB (Divisor Latch Access Bit)
In order to access the divisor latch register, you need to set the bit to 1. To access another register, set the bit to 0.
</td></tr>
</table>

Table 7.6. Function of Each Register < *3 / 4* >

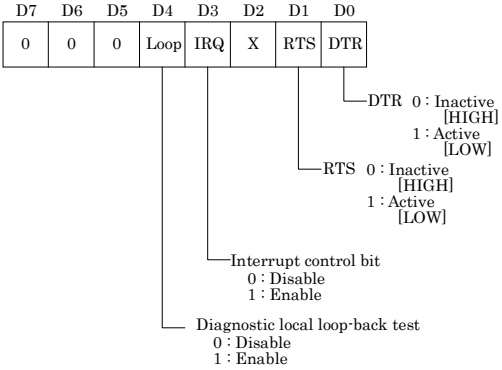
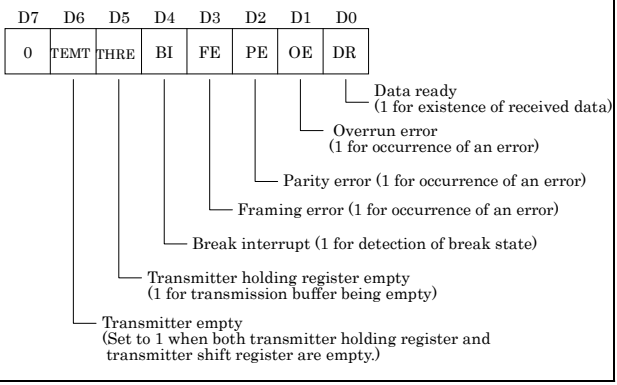
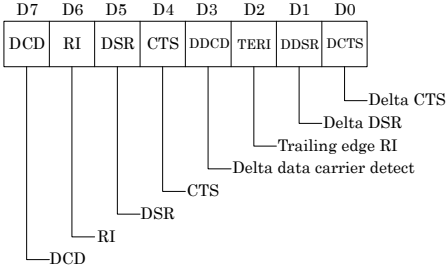
I/O address	Description
03FCH	MCR: Modem Control Register 
03FDH	LSR: Line Status Regester 

Table 7.6. Function of Each Register < *4 / 4* >

I/O address	Description
03FEH	MSR : Modem Status Register 
03FFH	SCR : Scratchpad Register This is an 8-bit, readable/writable register which is available to the user to allow data to be saved temporarily.

Baud Rate Settings

A baud rate is set by software by dividing the clock input (1.8432MHz). The baud rate in terms of hardware can be set to a maximum of 115,200 bps for SERIAL A, B, C and D. The baud rates available in practice depend on the operating environment (cable, software, etc.). The table below lists typical baud rates and their respective values to be written to the divisor latch register (LSB, MSB).

Table 7.7. Baud Rate Settings

Baud rate to be set	SERIAL A, B, C, D Clock input (1.8432MHz)	
	Value to be set in the divisor register (Decimal)	Setting error (%)
50	2304	---
75	1536	---
110	1047	0.026
134.5	857	0.058
150	768	---
300	384	---
600	192	---
1200	96	---
1800	64	---
2000	58	0.69
2400	48	---
3600	32	---
4800	24	---
7200	16	---
9600	12	---
14400	8	---
19200	6	---
28800	4	---
38400	3	---
57600	2	---
76800	---	---
115200	1	---
153600	---	---
230400	---	---

Example: To set 9,600 bps, write “00” to the (MSB) divisor latch register and “12 (decimal)” to the (LSB) divisor latch register.

Watch-Dog-Timer

The watchdog timer serves as a safeguard against possible system lock-up in your industrial computer system. In most industrial environments, there are heavy equipment, generators, high-voltage power lines, or power drops that have adverse effects on your computer system. For instance, when a power drop occurs, it could cause the CPU to come to a halt state or enter into an infinite loop, resulting in a system lock-up.

The application software created by user with the watchdog timer enabled, a RESET automatically generated unless the software periodically triggers the timer within the setting time-out interval. That is, while the system gets hung up, the running program can't trigger the timer periodically. The timer will generate a reset signal to reboot the system. This feature allows a running program to restart in an orderly way when a power glitch or any abnormal condition occurs.

The watchdog timer comes with 255-level time-out interval, 1 - 255 seconds per interval, which can be adjusted by software setting. There is a tolerance of 2 second for this time-out interval. To maintain normal system operation, consider allowable error and create a program to re-trigger the watchdog timer.

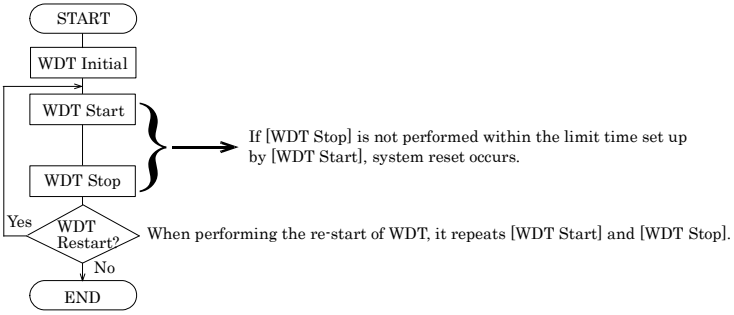
CONTEC's Web site [IPC-SLIB-01], which is bundled with this product, contains a sample program for the watchdog timer. To view the sample program for the watchdog timer, decompress "HWMandRTCut.zip", which is found under \RasUtility\Samples\Module.

For example, if the time-out interval has been set to 30 seconds, your program should trigger the watchdog timer before 28 seconds are escaped. Otherwise, after 28 - 32 seconds are escaped, the system will automatically reboot.

The I/O port is defined at address 2e/2fH. You can trigger/enable disable the timer by writing address 2e/2fH.

Here is an example for flow chart and programming how to use the watch-dog-timer.

(1) Example flow chart


START
WDT Initial
WDT Start
WDT Stop
If [WDT Stop] is not performed within the limit time set up by [WDT Start], system reset occurs.
Yes
WDT Restart?
When performing the re-start of WDT, it repeats [WDT Start] and [WDT Stop].
No
END

* It is also possible not to perform [WDT Stop] instead of performing [WDT Stop] to [WDT Start], but to perform [WDT Start] continuously at the time of a re-start.

(2) Example programming

The following example is written in Intel8086 assembly language.

```
;===============
;<WDT Initial>
;===============
;-----------------------------------------
;Enter the extended function mode
;-----------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;-------------------------------------
;Set WDT function at pin89
;-------------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
MOV AL,0DH
OUT DX,AL
;-------------------------------------------------
;Select logical device WDT(number 8)
;-------------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-------------------------------------------------
;Activate logical device WDT(number 8)
;-------------------------------------------------
MOV DX,2EH
MOV AL,30H
OUT DX,AL
MOV DX,2FH
MOV AL,01H
OUT DX,AL
;-------------------------------------
;Set timer unit : second
;-------------------------------------
MOV DX,2EH
MOV AL,F5H
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL
;-----------------------------------------
;Exit the extended function mode
```

```
;-----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL

;================================
;<WDT START : counter set and a start >
;================================
;-----------------------------------------
;Enter the extended function mode
;-----------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;-----------------------------------------------
;Select logical device WDT(number 8)
;-----------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-----------------------------------------------
;Set time of WDT and start to count down
;-----------------------------------------------
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
;-------------------------------------------------------------------------------
;The data of an example is 15 seconds.(01H=1sec.- FFH=255sec.)
MOV AL,0FH      ; 0FH = 15Sec.
;-------------------------------------------------------------------------------
OUT DX,AL
;-----------------------------------
;Exit the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL

;==============
;<WDT STOP>
;==============
;-----------------------------------
;Enter the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,87H
```

```
OUT DX,AL
OUT DX,AL
;-----------------------------------
;Select logical device WDT(number 8)
;-----------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-----------------------------------
;Stop count down of WDT
;-----------------------------------
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
;-----------------------------------
;The data of 00H is stop WDT
MOV AL,00H
;-----------------------------------
OUT DX,AL
;-----------------------------------
;Exit the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

⚠ CAUTION

The timer's intervals have a tolerance of ±2 seconds.

Battery

Battery Specification

This product uses the following battery.

- Type : Lithium primary battery
- Model : CR2032
- Maker : KTS
- Nominal voltage : 3V
- Nominal capacity : 220mAh
- Lithium content : 1g or less

Removing the battery
Remove the battery according to the following figure.

(1) Remove the screws on the back and remove the back cover.

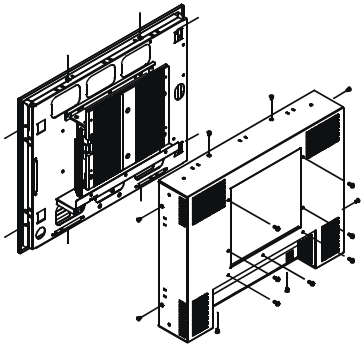


Figure 7.1 Removing the battery 1

(2) Remove the screws fixing the heatsink and remove the heatsink.

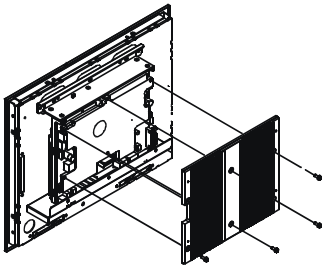


Figure 7.2 Removing the battery 2

(3) Remove the screws fixing the battery and remove the battery.

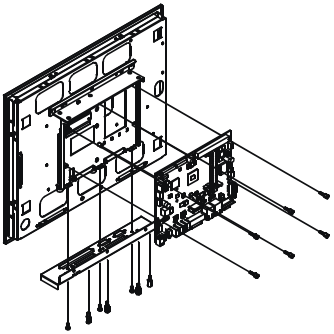


Figure 7.3 Removing the battery 3

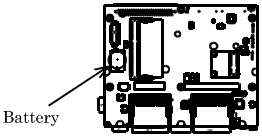


Figure 7.4 Removing the battery 4

Disposing the battery

Dispose the removed battery properly as instructed by local government.

8. List of Options

AC adapter

- IPC-ACAP12-04 AC adapter (Input: 100-240VAC, Output: 12VDC 4A)

⚠ CAUTION

When you use this AC adapter with PT-S959, the current consumption of USB + 5VDC should be 1.0A or less for four ports in total.

Screen protective sheets

- IPC-CV12 12.1-inch screen protective sheets (10 sheets)

⚠ CAUTION

Note that the sheets may not protect the screen because it is a few millimeters smaller than the screen size.

Protective sheets		PT-S959 Series	
Model	Sheet size (mm)	Model	Screen size (mm)
IPC-CV12	250.0 × 188.0	PT-S959LX-DC6xxx	249.0×188.5

CFast card

- CFS-4GB-A 4GB CFast card
- CFS-8GB-A 8GB CFastcard

Hard disk

- PC-HDD100S 2.5-inch SATA HDD 100GB

Other option

- IPC-SND-03 Desk stand

* Check the CONTEC's Web site for the latest information on these options.

PT-S959LX Series
User's Manual

PT-S959LX-DC6000

PT-S959LX-DC6100

CONTEC CO.,LTD.

November 2012 Edition

3-9-31, Himesato, Nishiyodogawa-ku, Osaka 555-0025, Japan

Japanese http://www.contec.co.jp/

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Management No. NA02222

Parts No. LYPQ711